MODEL AIRPLANE NEWS

OCTOBER 1949 • 25 CENTS

NATIONALS ★ Winners & Photos

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By BILL WINTER

NATIONALS

Everything about the Eighteenth Nationals, recently concluded at Olathe, Kansas, was *big*. Eleven hundred and eighty-eight contestants, including visitors from the Philippines, the Canal Zone, and Hawaii, far exceeded last year's entry list, and *that* was considered the most successful Nationals to date. Big? Why even the thermals were the biggest in memory—at least to Easterners. The final day was clear and hot and the only thing you could find in the cloudless blue sky were white pin points, motionless for minutes on end, that were models a mile or more above the earth. Dick Everett's hydro got off for 48 minutes. A Pan-American weight lifter was up for better than a half hour, while many other payload jobs hooked thermals right and left, like normal free flight jobs. Why, man, these were the mightiest thermals of all time! One missing entrant was said to have spread his arms carelessly over a hot runway. Dick Gelvin's *Rudder Bug* radio job snagged a thermal and, after fourteen turns of a spin, Dick allowed I might as well sit down and have a smoke. He left the ship in its spin. It took 20 minutes to terminate the flight. At times Gelvin got so high that controls would remain untouched while all hands tried to detect which way the speck was moving. At that he came close to the spot when he landed!

The biggest model airplane in all captivity made its debut this year. Have you heard of Hubert Entrop's 20′ monster free flight, a picture of which appeared in this magazine some months back? It had four thousand square inches of area. "I can take off these panels, and change the area to 3000 square inches." Unquote. Entrop's *Orwick* ge's the behemoth up to 100 or 150′, at which ltitude the giant begins to ooze along, picking up a foot or two on every slow circle until it reaches a thermal. After the better part of a half hour, you could barely see this 20 footer, so high did it go.

The wind blew for the first three days, then it rained. What happened after that was sheer murder—but that last day sent us all home happy. Take radio. There were over 30 entrants and, after that long delay, the event looked like a subway rush hour crowd. You couldn't get in edgewise. The instant one guy landed the next went into the air. Except at lunch hour—this is a gentlemen's event, they stop for lunch!—you couldn't even ground check your equipment. After hours, if enough light remained, it was first come, first served. At least once two models got into the air simultaneously. One pilot would hit right rudder and the other fellow's airplane would do the same! After a Saturday night check flight we were set for an all-or-nothing flight on Sunday morning. Maybe we can sneak a low place, we figured. With Cal Smith helping out, the timer was blocked off and the big tank filled. If George De La Mater hadn't been out hunting his model, ours would still be lost! The stab had worked loose and we got nothing but right circles, with *tighter* right circles. Until you get out there, pushing buttons, while the plane does the opposite of what you intend it to do, you have no idea how superfluous you can feel! Said Walker, "Why don't you check things?" Good question. Anyhow, Walt Good showed how it should be done, to take first place. At least six other jobs put on a most impressive performance. Radio *has* arrived. Next year they will be swamped. Incidentally, whoever assumed that R.C. jobs don't glide well? One *Rudder Bug*, overweight to the tune of six-odd pounds, glided for minutes one morning and appeared to sink no more than a passing *Sailplane*. Some builders are thinking of ways and means of spoiling that glide.

Free flight crashes were bigger and better than ever. Inadvertent snap rolls, going from a right wind-in to a left wind-in, out-

(*Turn to page* 6)

WAKEFIELD FLASH! Finland wins Wakefields, Italy 2nd, U. S. A. 3rd! Above are the U. S. Team minus Bob Hanford, who was delayed, and Manager Frank Zaic, who had already left) chatting with M. A. N. Publisher Jay P. Cleveland, at a luncheon given in New York by the U. S. Rubber Company just before the team departed. Left to right, seated: Andy Petersen, Ed Lidgard, Joe Boyle, Jr. Standing: Jay P. Cleveland, Warren Fletcher (top U. S. man in Meet) and Ed. Naudzius

MODEL AIRPLANE NEWS

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HOWARD G. McENTEE ..... Editor
WITTICH D. HOLLOWAY ..... Art Director

Contributing Editors: Charles H. Grant, Robert C. Hare, Lew Mahieu, Robert McLarren, Leonard Wieczorek

Advertising Department. MAIN OFFICE: 551 5th Ave., New York 17, N.Y. WEST COAST: (Calif., Ore. and Wash.) Justin Hannon, 4628 Crenshaw Blvd., Los Angeles 43, Calif.

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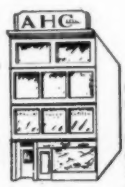

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Terminal Clips, 2 for ..... .05
Arden Battery Cord kit ..... .85

PROP EXTENDERS

5-8" -2¢e. 11.16" -25¢.1-1/4 .45
1¾"-65¢.1-3/4"-90¢. 2"-1.95
2¼" or 2½" - 1.00; 2¾" ... 1.25
3"Needle Nose 1¼" dia..... 1.35

PROP NUTS

2" 1.20
Adapter Nuts (state engine) .20
Plastic 1¼" ..... .50

PROPS

Heli-arc Streamlined (pr)1¼".45
1" - 50¢, 2" ..... .75
Pneumatic (pr) 2¼" 2.50
2½" - 3.00, 4½" 3.50
Semi Pneumatic(pr) 2" .85
2½" 1.00, 3" 1.50

PROP ACCESSORIES

Sponge Rubber, Dural hub (pr)
7/8"-25¢.1-1/8"-30¢.1-3/8" .30
1-7/8"-45¢, 2-3/4" .60
Sponge Rubber, Wood Hub (pr)
2"-40¢, 2½"-50¢, 3" ..... .60
Steel Aluminum, fit.) 9½" .35
.020"-55¢ .032"-75¢ .064" 1.25
Sparky Tail Wheel Assembly .25

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Metal, side by side, penlite .40
medium - 40¢, regular ..... .60
4-pencell ..... .75
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Plastic, for 2 penlites 1.25
Paper ..... .25

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Tiger Fuel Pump ..... .60
Fuel Line Filter ..... .35
Motor Cover ..... .25
Elgin Stop Watch 12.50
Midget Screw Driver ..... .10
Metal Motor Mounts.Sm-.30¢,Lg.50

WIRE

.006,.008,.010,.012,.014,.016 dia. 2-52' lines ..... .50
.010,.012,.014,.016,.018, .020 dia. 2-70' lines . .65

CONTROL LINES

Standard control lines .008,.011,.014 2-70' ..... .85
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U-Reely Remote 12.50
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Neoprene Tubing, per foot. .10
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Bond Control handle ..... .25
Metal Handles ..... 1.00&1.25
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E-Z Plastic Control Handle .85
Simplex Handle & Reel 1.25
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Weco Bellcrank ..... .25
Elevator control horn, ... .25
Horns(heller.) 32"-10¢, 4" .15
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Elevator hinges 4 for ..... .15
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Queens Yacht 20" B-C-D 5.50
Chris-Craft Runabout 5.50
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Vinyard 25", BCD 5.50
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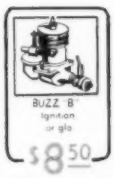

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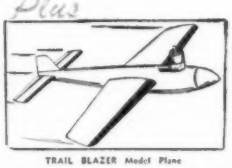

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Plus not 75, not 100 but ALL **ACCESSORIES including:**

●PLUS: Correct size finished propeller ● 3-way plug wrench ● Presto Engine starter with handle and cord ● Speed indicator tables ● Log Book ● Motor cover ● Spark or glo plug with gasket ● Complete engine instructions ● 24 page Gas Engine Theory Manual ● Engine adjustment chart ● Metal fuel tank and gas line ● Metal Battery box ● Wilco Quality Coil ● 12" Hi-tension lead wire and end clips ● 18" insulated ignition wire ● Ignition slide switch ● Coil holder and mount ● Everlast condenser ● SAE # 70 Oil ● 4 ignition wiring lugs ● Spark plug guage set ● 2 plane identification tags ● 72 Insignias ● 72 page book on Control-liners, How to build and fly them ● Cement ● Sandpaper ● "Pro" all-metal knife and blade ● Metal bellcrank with bolt, nut and washer ● Elevator horn ● Elevator hinges ● Lead-in wire ● Push-rod wire ● U-Control handle ● 100 feet U-Control stainless steel wire and reel ● Membership in Modelcrafters of America ● 24 page giant 2-color catalog ● Postage ● Packing ● Insurance.

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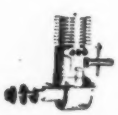
have been offset by the tremendous demand for BUZZ ENGINES. That's the only reason we are able to continue to offer you these Ignition BUZZ Engines at only $4.95! Note we have been able to reduce the price of the "60" ..... it, too, is only $4.95!

NOW! EACH ENGINE ON THIS PAGE..... $4.95 ASSEMBLED & TESTED

GLO BUZZ 19, 29 & 35 $4.95 EACH

The Interchangeable Class A, B and C Buzz Engines in glo-plug operation! The BUZZ 19, 29 & 35 Engines lead the field in low-cost FLYING FUN! Thousands of modelers all over the world depend on the rugged construction and easy starting of BUZZ Engines every day for their FUN in FLYING. Can be interchanged on the field so you can fly the same model in Class A, B or C.....the crankcase mounting holes are identical.

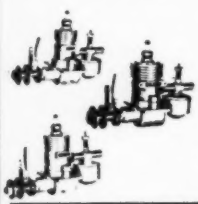
GLO BUZZ "60" $4.95



.....for large Class D models in Free-Flight or U-Control or as a simple way to avoid ignition interference for radio-controlled flying! Wherever you have a lot of airplane to haul skyward, use this powerpacked "60". It's the engine that generated power for the field-command radio sets with the Army during the last War. A flip will start it and you'll have continuous, smooth power for every flight.

The BUZZ 19, 29 & 35

EACH $4.95



Thousands of modelers all over the world have depended on these ruggedly-constructed, easy to start BUZZ A, B & C Engines. They've changed engines on the field and have flown the same model in all three events not once, but repeatedly, contest after contest. Four screws to change and your plance flies in a different class...the crankcase mounting flanges and screw holes are identical in all three engines.

A BIRTHDAY WE'RE PROUD OF

BUZZ Engines recently passed their first Birthday. One year has passed of selling these famous engines to hobbyists all over the world. The letters and enthusiastic comments we have received make us proud of the fact that we can supply quality engines at this low price of $4.95

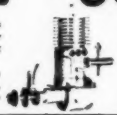
BUZZ CO2 ONLY $4.95

The BUZZ CO-2 Engine is the first 3/16" bore & stroke engine on the market. Thousands have been sold and thousands of modelers have enjoyed the dependable power and economical operation of this intermediate-size engine. The refillable tank allows five flights per CO-2 Cannule ..... less than 2¢ per flight! Engine is complete with refillable tank connected to engine and a capsule tank-charging unit that is die-cast.

Use the BUZZ "60"

for the same dependable, easy starting smooth power that thousands of modelers have been enjoying since this engine was first offered a year ago. This is the engine that powered field-command radio sets during the last War.

Use the Buzz 60 for your large Class D Free-Flight or Controline model. Each engine is factory tested and will provide you with smooth, dependable power that will avoid crack-ups and disappointments in contest or sport flying.



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Some facts about BUZZ Engines.....

SPECIFICATIONS:

	19	29	35	60	CO-2
Displ.	.199	.299	.350	.610	——
Bore	.660	.812	.880	1.000	3/16
Stroke	.562	.562	.562	.777	3/16
Horsepower	1/9	1/6	1/5	1/4	——
RPM	7,500	8,000	8,500	9,000	variable
Prop	8"	10"	11"	12"	5½
Weight	4	4¼	4½	9	½

The BUZZ Engines are manufactured by a company that for years has been the world's largest maker of automobile replacement pistons and other precision gasoline engine parts. Thousands of gas engines and parts were made during the war by this company for the War Dept. for use in walkie-talkies, field generating sets, etc., etc. Since the war, thousands of gas engines have been made for scooters, lawn mower and other industrial uses. When we say unconditionally that the BUZZ engine is well engineered and well constructed will give you plenty of good service, this is no idle boast, but a fact!

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IT IS BEGINNING to look in Washington like the B-36 investigation will result in a lot of heat but not much light. However, there is now little question that there will be first-class fireworks and the preliminary skirmishing has already begun. Secretary of Defense Johnson has suddenly reversed his "sink the Navy" stand and, instead, has now embraced Naval Aviation as an essential part of national defense and has even stated that the aircraft carrier is a *vital* weapon in this nation's arsenal! This latter view was expressed in an awkward attempt to claim authorship of the Navy carrier deck-strengthening program (to permit older carriers to handle new, heavier attack planes), which was approved under the late James Forrestal and money okayed by Congress months before Johnson took office. This endorsement of Naval Aviation, designed to ward off any charges of Air Force favoritism by Johnson, is also expressed by all top-ranking Air Force Generals, who have given it a generous pat on the back in their recent speeches.

JOHNSON'S LATEST maneuver was an order to all generals and admirals receiving requests from Rep. James Van Zandt (R., Penn.), leader of the probe, for personal opinions on the B-36, to submit their replies first to Johnson's office for "coordination" prior to transmittal to Van Zandt. When the latter heard of this move, he demanded an explanation from Johnson, who explained his only aim was to ensure that Van Zandt received the full and complete story! Meanwhile, the Air Force's story has become clear and revolves around the key point that since it takes longer to build very heavy bombers, they should be built in peacetime in quantity so that they will be ready immediately in the event of war. Next in the time cycle is the medium bomber, which the Air Force has ordered in moderate quantity and lastly comes the fighters and other aircraft which could be produced more quickly. This defense of the B-36 procurement program is, of course, quite sound and there is little question that after the rumors and counter-charges have died down, the Air Force view of the matter will prevail. Nevertheless, it still seems strange that the Air Force should put all of its money into the production of a 1941 bomber instead of ordering smaller quantities of postwar, high-performance types, including the recent jet bomber models.

IT LOOKS like we have only seen the beginning of Air Force interest in flight refueling. Boeing Aircraft has now developed a new system that uses no hose! Instead of the long, winding hose that trails out into the air and is grasped by the bomber, as in the British Flight Refuelling, Ltd., system used on the recent round-the-world B-50 flight, Boeing has developed a rigid pipe which extends from the tail of the tanker and against which the bomber places its nose. The pipe has flexible couplings at both ends and small control surfaces at the aft end that permits the operator, lying in the tail of the tanker, to "fly" the boom into position for the bomber contact! The fuel is pumped under pressure, thereby decreasing the time required over that of the gravity-feed system used with the hose. So there's a new job in aviation: "boom pilot."

AIR FORCE is now looking for aerial tankers, which will carry considerably more fuel than is available in the standard B-50 bomber. Boeing has already designed a flying tanker version of the C-97A *Stratofreighter* and the convair C-99 (transport version of the B-36) and the Douglas C-124 *Liftmaster* are being studied as possible mid-air refueling transports. The British have successfully refueled jet fighters in mid-air and rumors are that the Air Force has accomplished the same trick. One huge tanker could supply three to six jet fighters, thereby greatly increasing the latter's ability out at its extreme range. However, the major problem in jet fighter refueling is precision timing, since the jet cannot afford to "wait its turn" while it burns up fuel at a rapid rate. But if a jet fighter could renew combat at about 30,000' with a full load of fuel, instead of being forced to make the long, fuel-consuming climb to this altitude, then the bomber interception tables might easily be turned.

ONE OF THE radical new jet bombers is the Martin XB-51 medium bomber (comparable to the Boeing XB-47). It is powered by three General Electric J-47 turbojet engines, two in the wings and one in the fuselage. It is swept wing and fast, but what makes it radical is its variable-incidence wing, a device that has been proposed for more than 20 years but which has never proved successful. The swept-

(*Turn to page* 53)

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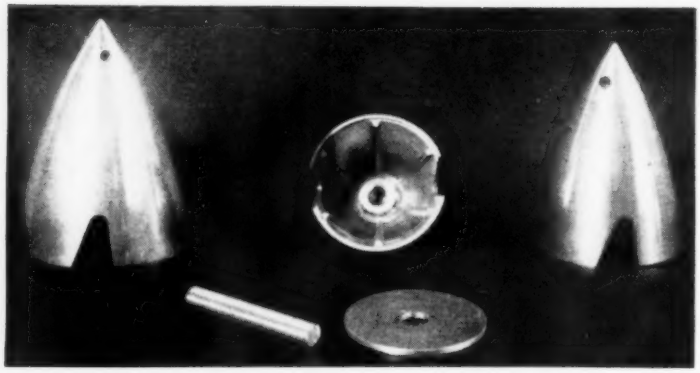

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Scrap Box

(*Continued from page* 1)

side loops, and inverted flight, were among the gyrations. Evidently, free flighters are luckier than speed boys, for you wouldn't want anything wilder and woolier than hundreds of hot free flight ships pouring off from take-off in a stream from a line-up a dozen ships wide. Maybe it is worth it, for high time in the rain bettered six minutes (one flight).

Funniest Things At the Meet: Harry Geyer, the radio man, all by his lonesome inside the radio control tent abreast the runway when the Lockheed *Constitution* landed directly alongside and reversed its props. He thought his day had come . . . Jim Walker demonstrating his "new dethermalizer" to the monster crowd on Sunday afternoon. A helper winds one of his *Hornets*. Both bend over it to actuate the dethermalizer device. Jim launches the model. About 20' high, it blows up. Nothing like a firecracker for positive dethermalizing! . . . the midnight races in Hangar 43. The place was mobbed. Loud cheers. Sleepless contestants (who wants to sleep anyway?) were sticking O.K. *Cubs* in the nose of Jim Walker gliders, then tieing the models, two at a time, to a center pole. No air race can hold a candle to these wild affairs. When the gliders didn't go fast enough, they clipped the wings! . . . Chet Lanzo with his R.C. glider in tow launch. The boys beamed broad mindedly while Chet put in two so-so flights, but then he hit a thermal. Pushing buttons while the ship circled directly overhead for six minutes, he was surrounded by people tearing out their hair by the handfuls. Chet, 'tis said, was the cause of more protests than any other modeler of history. Actually, the rules do not ban R.C.—the stunt man who lost a half wing doing the pattern. He hurdled the snow fence some 100' away and landed the wounded ship on the grass. When he climbed over the fence on the way back, he got hung up . . . the boy who won the Jim Walker trophy, (Thom, we think) who was flying two little bipes in an amazing demonstration of one man aerobatics. One job cut out overhead and fell kerplunk on the concrete. Trying to take up the slack, Thom fell flat on his back, the second airplane still in the air, behind him, unseen. Thom looped it, recovered his feet, and finished the flight. Oh, brother!

The greatest show was put on by U-control, that last Sunday afternoon. U-control exhibitions have far greater show value than most of us suppose. In this case four circles were active. To the left, we had Jim, the Walker, flying three *Fireballs* at once. This is the deal where he controls one model from each hand, the third from a pivoted pylon attached to his helmet. Since Jim uses motor control on all three, he holds something or other in his teeth. Next to Jim was the team racing circle with Keith Storey briskly waving nice green and black-and-white checked flights to start the heats and signify the winners. Sometimes two airplanes race for 21 laps, at other times three pilots are in the center. The guys going round and round in the middle are as interesting to watch as the models. They say some interesting conversational tidbits may be heard if you get close enough. Nonetheless, team racing ran smoothly enough in demonstrations. Looks like real fun. In circles three and four, was the run-off of the flying scale event. Since nine multi-motored jobs were entered, the show was bound to be good. We saw a *Black Widow* pulling up its gear, and putting it back down again, too! A B-29 roared around. A B-17. These four-engined pilots carry under their arm a box which makes them look like dizzy ice cream salesmen. On these boxes are various controls which the pilot works with his extra hand, cutting out one engine at a time until the machine lands. Look at that B-17 doing wing overs! Let me out of here! This three-ring, rather four-ring, circus held all onlookers spellbound for hours on end.

There's a serious side, too. June Pierce passed away during the meet. June could

(*Turn to page* 42)

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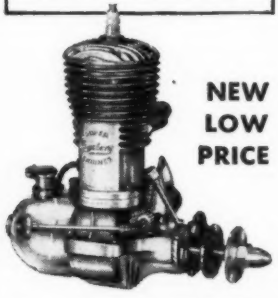

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REPORT FROM THE WEST

by Lew Mahieu

NATIONALS

We have recovered somewhat from the Nationals, sufficiently anyhow to write about it. Although the Meet was well run and we had a lot of fun flying and talking to our friends, we were mighty glad to get back to California and the *cooler* weather. One whiff of that good old sea breeze fixed everything! The West Coast didn't have the representation this year as far as numbers, but for bringing home the bacon—the results were the same. The boys walked off with 17 first places, and of course, a West Coast modeler is again National Champ. Ray O. Acord, the 1949 National Champion, was a member of the National Championship Club—the *Flightmasters*. Members of this team were among the fortunates who received free airplane rides to the Nats. They were the passengers of Irwin Ohlsson and Harry Rice on the "O & R Special." Members of the *Flightmasters* team which claimed some 24 places were: Ray Acord, Russell Snyder, Jack Butler, Don Kennedy, and Bill Tharp. Congratulations *Flightmasters*.

As usual the *Oakland Cloud Dusters* were in there piling up a lot of places. The *Cloud Dusters* came very close this year to winning the Club Championship again. Manny Andrade totaled the most points for the team with two firsts, one second, two fourths, and a tenth. Joe Bilgri, Michael Demos, and the others were doing just about as well.

A group of modelers from the vicinity of Seattle, Wash., also made a fine showing. E. L. Enticknap with his original *Cyclone* powered design—the *GOOL*—won two first places, and he set two new records with the same ship. He turned in a perfect score in Class D Open Free Flight when he sent The *GOOL* up for three ten-minute flights. In the R.O.W. event the *GOOL*, equipped with floats, had a three flight total of 21:33. That friendly gent, Chuck Hollinger, placed third in both the U-control Flying Scale and the Rubber Flying Scale. Chuck had about the cleanest Class A PAA-Load design at the meet but only took a fourth in that event.

Hank Cole always manages to get his indoor jobs caught in the top of the Kansas City Auditorium and after he manages to get them down, he is black all over. As Frank Green says, "That nook in the top of the K.C. Auditorium should be called the Cole Bin." Hank placed fifth in Indoor Stick and third in Outdoor Cabin.

Hubert Entrop, who had the largest free flight ships at the meet, placed third in Class B PAA-Load. His Class D free flight had a wing area of more than 4,000 square inches! Other Washington Modelers seen at the Nats were Jerry Stebbins, Gerald Thomas, Norman Baronski, and Martin Erickson.

Only a few of those hot modelers from San Diego showed up. Denny Davis of the *Aeroneers* took second in Class C Free Flight and second in Class B PAA-Load. Think we are going to start ribbing Dick Everett as being a second rate modeler. All kidding aside, Dick is a top notcher, also from the *San Diego Aeroneers*, but he always comes out second best in local meets as well as at the Nationals. Dick did all right at Olathe though, winning second in Outdoor Stick, second in Class A Free Flight and third in R.O.W. Oh yes, he was another lucky boy who got a ride on the "O & R Special."

Right here let's insert a bit of humor. All the contestants and officials at the Nats have probably heard this, but for you who haven't, here it is. We were told of a fellow at the Nats who had Class B Speed in the bag, so to speak. He went into detail to describe his theory on propellers, how air is a solid, etc. He claimed that his propeller worked on boats as well, (in fact it looked like a boat propeller) and increased the speed of a boat as well as the mileage. He tried two test flights on his speed job but both times he had the handle upside-down; he couldn't figure why it wouldn't take off. He claimed flights up to 216 mph with a *McCoy* .29 and is going to switch to a *McCoy* .49 so he can reach the 300 mph mark. Can this be true?! If you want to split your sides, just ask Sam Beasley to tell you his version of the story.

A 25 mph wind was responsible for about 50% of the speed jobs cracking up on Class

(*Turn to page* 36)

Club Champions at the '49 Nats were the *Inglewood Flightmasters*, shown here with their trophies. Left to right, standing: Bill Wisniewski, Don Kennedy and Jack Butler. Front row: Bill Tharp, and Ray Acord (who was also Individual National Champ). These boys, along with other West Coast modelers were flown to Olathe in the "Ohlsson & Rice Special," in front of which they are grouped

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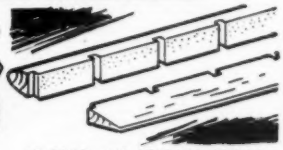
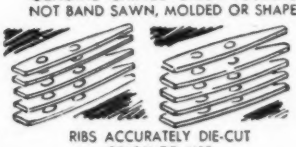
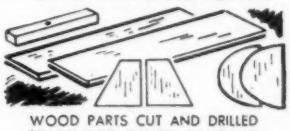


LEADING AND TRAILING EDGES SHAPED AND NOTCHED FOR RIBS

LANDING GEAR, READY FORMED SPRING STEEL

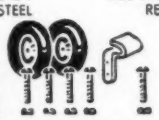


RIBS ACCURATELY DIE-CUT READY TO USE



WOOD PARTS CUT AND DRILLED READY FOR FINISH SANDING

OUTLINE CUT BALSA WING TIPS



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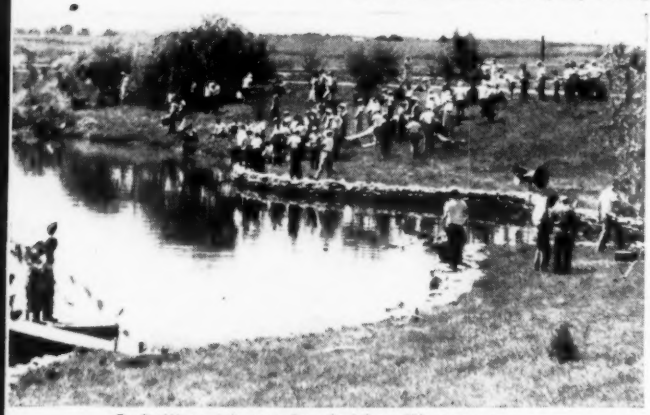
Paul Gilliam launches Civy Boy 84, big brother of the 74 described in this issue

from The Field At Olathe

by HOWARD G. McENTEE

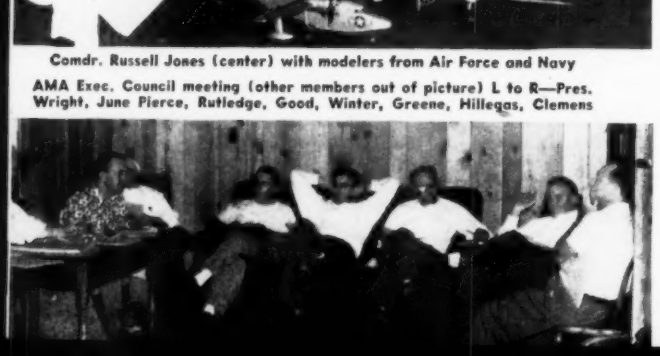


R. O. W. models were launched from this corner; lake is much larger than small area shown here

Seven of eleven *Rudder Bugs* in Radio event; note slight variations

Comdr. Russell Jones (center) with modelers from Air Force and Navy

AMA Exec. Council meeting (other members out of picture) L to R—Pres. Wright, June Pierce, Rutledge, Good, Winter, Greene, Hillegas, Clemens



THE first thing many modelers ask after a big meet has been held is—"How was the weather?" Let us report right at the start that it was "variable." The initial three days were very hot and humid, with a breeze strong enough to blow many free flight models clear out of the mile square field and into the farms beyond. By Friday, the humidity had gathered to such an extent that it just *had* to come down. Though the showers continued all day off and on, many official flights were made and some good times and speeds were listed. With the air cleared, Saturday and Sunday were really beautiful, with blue skies, hot sun, and some fine thermals.

As everyone knows by now, the 18th Nationals was held July 26 to 31, at the Naval Air Station, Olathe, Kansas, and was jointly sponsored by the Navy, the Olathe Chamber of Commerce, and The American Legion, Earl Collier Post. Whereas in 1948 about 830 contestants attended the meet, word of the ideal location apparently got around since there were close to 1200 contestants this year. On top of this great increase, it appeared that a good many more contestants brought their families, and there was a big increase in other nonflying guests. Saturday, and especially Sunday, the spectators from surrounding areas really poured in, and although they were swallowed up by the huge field, traffic jams on roads leading away from the area attested to the large crowds that attended.

Though the meet was a great success for the modelers and spectators, accidents and sickness among meet officials put a serious damper on proceedings at the start. Saddest of all was the sudden death on Tuesday night of "June" Pierce, one of the most well-known and beloved model enthusiasts of the entire Mid-States area. June was on hand to officiate at the Radio Control event; to those of us who had talked with him on Tuesday, his death from a heart attack was a really heavy blow. A large collection, taken up around the field next day, will be used to establish a June Pierce Memorial Trophy.

The misfortunes started even before the meet, when Leo Rutledge, who was slated to be Director of Rubber and Glider events, collided with a Naval airplane which had been set up at the road intersection leading to the Air Station, and which was being towed into the field for the night. Leo suffered numerous cuts and bruises, but was released from a Kansas City hospital in time to see most of the meet. Later in the week, another contest official, Jess Hall suffered a badly cut arm,

Sal Taibi, famous gas modeler, launches rubber job as his wife watches tensely

A portion of the workshop hangar which was 200' square. If you think there's not much activity, note that this shot was made at 3:30 a.m.

At left Editor McEntee presents M. A. N. trophy for R. O. W. event to E. Enticknap. Next is Howard Thombs, with Jim Walker trophy. Then we see Ray Acord, 1949 Nat'l Champion. Robert Dunham holds Berkeley Award for Outdoor Rubber Cabin; at far right, George De La Mater with Bloomingdale trophy

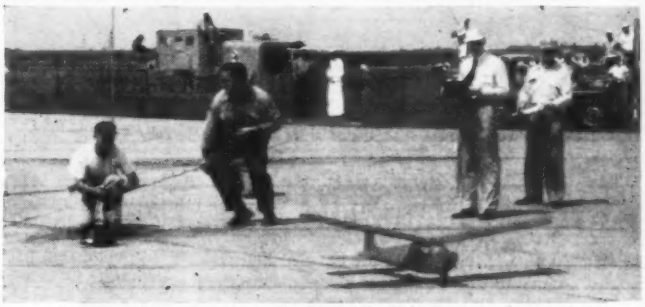
Photos by Doris and Ed Yulke

when struck by a gas job which had spun in. In between these mishaps, Maurice Roddy, Aviation Editor of the CHICAGO TIMES, was taken seriously ill, and was rushed back home by plane! At last reports, all the sick and injured were recovering nicely.

The Navy gave up even more of its facilities than ever before to the modelers for this meet. Whereas in 1948 one hangar was cleared out as a work room for the builders, this year an even larger hangar was devoted to this use, and the "workshop hangar" of last year was devoted to press and registration centers. It also housed the main lunch counter, an exhibit of engines and equipment used in Naval planes, and a movie machine which showed official Navy films. The latter, though they were devoted mainly to safety practices, were so well and humorously presented that they were favorites with those modelers who had time to watch them.

Chief drum-beater for the Nats in 1948 and early '49 was Lt. Comdr. Tex Witherspoon who *really* put the pressure on Washington, D. C., and everywhere else, to insure that everyone knew all about the meet. However, in late spring Tex left the Navy to open a new radio station in Olathe. Though he still helped out all he could, he had to devote most of his time to his new civilian venture. For several weeks, the Olathe Air Station was without a Public Information Officer, and work piled up sky high. When Lt. (jg) Lee Stanley arrived to take over, just before the meet started, he found a formidable task confronting him, and Lt. John Burton and Comdr. Russell Jones came in from Washington to lend a hand. In addition to all the necessary paper work connected with the meet and with the regular Navy routine, these three officers kept up a barrage of press releases to newspapers, news services, and the like. They also appeared on numerous radio programs during the actual running of the meet, when they presented many interesting people of the model airplane world to both local and national radio audiences. Ably assisting the P. I. O. officers was WAVE Johanssen, who was ready to help one and all of the visitors out of any sort of difficulty, as the writer of these lines is fully able to attest.

As may be imagined, the shop hangar was truly a madhouse,



Harry Geyer launches radio ship, while Walt Good operates controls

Lt. Harry ("Pop") Vogler with Air Force model team as they arrived from Chanute field. Seven Navy and Air Force model teams came to Olathe

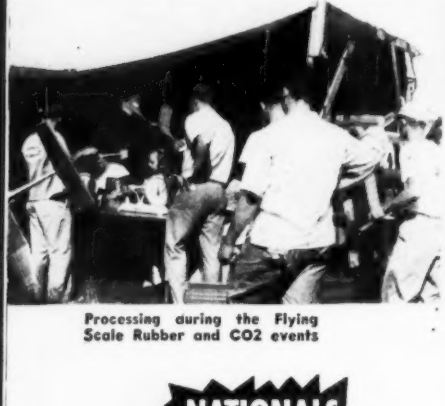
John and Biddy Mathews warm up *Forster* 29's on their prize winning B-29; ship weighs 14 lbs.

Chet Lanzo with his perennial *Puss Moth*. This ship has been a Nats fixture for 8 years

Dick Korda (right) and former Belgian Wakefield winner Van Wymersche warm up latter's gassie

Keith Storey (far right) supervises line-up as fliers get ready for a demonstration of Team Racing

This group from the *Toronto Model Club* filled their trailer with models, slept in a tent outside the workshop hangar.



Processing during the Flying Scale Rubber and CO2 events

Gary Kirst about to fly in his first indoor meet; ship showed real promise till spar broke

Both these PAA-Load models were used to "fly the mail" after radio model delivery

NATIONALS

with building and test flying going on every minute of day and night. One very popular indoor sport was the production of all manner of tiny controline models, powered by the various "1/2 A" engines. Though there were no official events this year for the "baby" engines, they were flown on stunt and speed jobs, in team races, dog fights, and so on, all in the windless confines of the hangar. Their popularity was such that they will certainly be given official status at the next Nationals.

The Indoor event was again held in the huge Kansas City auditorium and though that perennial goal, the 30-minute flight, was not reached, the top time of over 27 minutes by Don Donahue is good in any league. The microfilm ships were flown first to give the boys every chance to beat the record; Indoor Glider followed, and several flights of about one minute were recorded.

Outdoor flying started in earnest Wednesday, although the outdoor boys had full use of the field all day Tuesday for test flying. When the Nationals started this year, virtually every one of the models lost last year had been recovered. Recovery should be even faster and more complete in 1949, as more planes, cars, and men were assigned to the job. Moreover, this year the contestants didn't even have to chase their ships, no matter where the models landed on the field, for Navy jeeps were constantly combing the area to bring back every model as it came down.

The Controline events were held, as before, on the concrete runways. These events moved quickly and smoothly, with some fine flying shown, and several records broken. As has been the case previously, the Controline Scale event was very popular, and was again scheduled to fall on Sunday, when the largest number of spectators could watch it. There were more entries than ever before, including a B-17, a B-29, a *Black Widow*, and others too numerous to mention.

Exhibitions of Team Racing were given by Keith Storey and members of his F. A. S. T. group. Accomplished controline fliers from other areas were invited to join in, and the gospel of Team Racing should now spread far and wide.

A big thrill for the crowd came when one of the stunt contestants broke off the outer wing panel of his ship while engaging in violent maneuvers. The ship, though a bit wobbly, stayed in the air; the flier made his way to a snow fence just off the runway, vaulted over the rickety barrier—still flying his crippled model—and finally brought the latter down safely in the grass. He got a real ovation from the other contestants and spectators alike!

Flying Scale Rubber and the CO2 event, scheduled for Friday, were hampered by the showers, and had to be extended to Saturday, when they were flown concurrently with the roaring giants of Class D Gas. There were many CO2 ships, using all three of the available motor sizes. While top times in CO2 were only about one-half minute higher than at the '48 Nats, it is obvious that CO2 know-how is much greater now, as the average of all times of the winners is much greater than last year, and several Senior fliers topped the best efforts of the Open group! Some

(*Turn to page* 34)

design forum

by **CHARLES H. GRANT**

THE sun broke through some scattered clouds one June day in 1930 bringing joy to the young hearts of a group of model fliers. This was the date for the New England Championships. Hardly had the early morning clouds started to break when cars draped with models began to converge on the airport at Springfield, Mass. Present-day model fliers would have difficulty in recognizing these small aircraft as model planes. They were far different than the orthodox tractors flown so universally at the present time. Many of these ships, like the modern versions, were encased in beautifully made carrying boxes. These were quickly unloaded from cars at the airport and soon were disgorging the most peculiar looking aircraft. All of them except one consisted of a combination of sticks, longerons, struts, etc., supporting two wings, a large one at the rear and a small one at the nose. Two propellers mounted on bearings on the rear of the frame produced the required thrust when the rubber motors were lubricated and wound to capacity. There were no fuselage models. In fact, at this time an airplane with the propeller at the nose, that is a tractor, was a freak and usually a monstrosity because, believe it or not, these were most difficult to build and operate. Few model builders knew the proper proportions for a successful tractor.

Moved to create variety as well as to show the possibilities of tractors, one contestant arrived at the field with a twin tractor model. About ten years' research had gone into this airplane and it outflew all the others. From that time on, model builders began to focus attention on tractors. One after another asked questions concerning correct proportions and gradually tractor airplanes became more successful and popular. Today the situation is reversed. The twin pusher is the freak, not the tractor. Freakish, not because it is out of date or lacks flight capacity and efficiency, but because of model builders themselves. In the early days most builders turned to twin pushers because all they had to do was to make two fairly efficient wings, attach them to a couple of sticks, add propellers and motors and they had an airplane that would fly without the necessity for trick adjustment, special knowledge, or precise handling. These airplanes flew under all conditions. Strangely enough, they were not developed to their maximum efficiency before they were discarded for tractors. So, today the road is clear and completely open for careful and persistent model designers who will put thought on pusher design. Canard pushers properly proportioned will fly as well as, or better than, tractors, especially in the "stick" category of the rules.

A large amount of the efficiency of a pusher depends upon the application of a few simple design tricks. We will try to give them to you here in brief, but usable, form and if we appear to give facts without reason, write and let us know what your queries might be. However, if you will apply the following proportions to pusher design, we will absolutely guarantee success because they are the result of thousands of test flights with this type of ship.

Look at Fig. 1 which represents the side view of a canard pusher. One of the greatest problems is to know how large the front wing should be and where the center of gravity will be located.

Let us start with the C.G. problem. It has been found through tests that on all types of pushers the best location for the C.G. is at a point slightly to the rear of the center of the frame and one which is twice as far from the front wing as it is from the rear. Sometimes this point may be three times as far from the front as from the rear. These rules give best results and are illustrated in Fig. 1.

Unlike a tractor, the C.G. is between the wings of a pusher because part of the load is carried by the rear wing and part by the front. All horizontal surfaces give lift; on a tractor the tail surfaces usually merely guide the airplane or at least are less effective for lift. With the C.G. between the wings and twice as far from the front wing as from the rear, we are told immediately that the rear wing must carry twice the load of the front because the airplane is supported by lift L_1 and L_2 and C.G. is 1 unit, (A), from the rear, and 2 units (B), from the front. Lift $L_1 \times B$ = Lift $L_2 \times A$.

This is the fundamental law of loaded beams.

Knowing the loads, we know the required size of the front wing relative to the rear. Some will probably reason if L_1 is 1/2 L_2 the area of the front wing should be 1/2 the rear. This would be accurate provided both wings were set at the same angle of incidence. However, the front wing must have approximately 2 to 3° more angle than the rear. Usually the rear wing is set at about 1° (sometimes at zero).

In such a case the front wing is set at +3°. Now the problem is to provide the correct size of front wing (set at 3°) when the rear is set at 1°, so that the front wing will lift one-half as much as the rear. We know that if the front wing is set at the same angle of incidence as the rear, its area will be one-

(*Turn to page* 44)

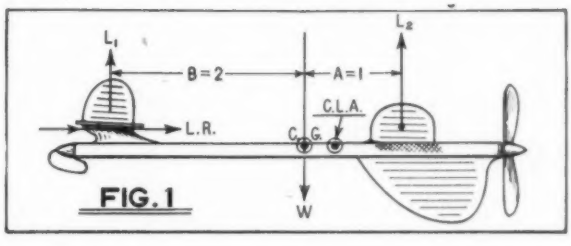


FIG. 1

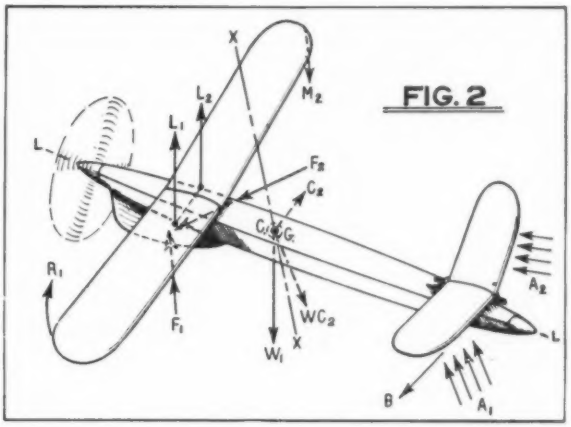


FIG. 2

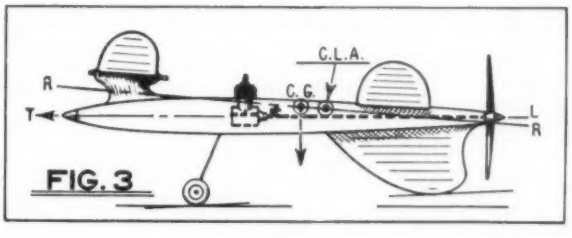


FIG. 3

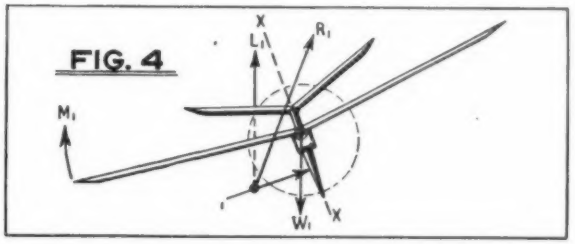


FIG. 4

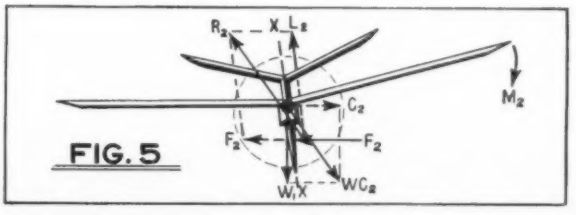
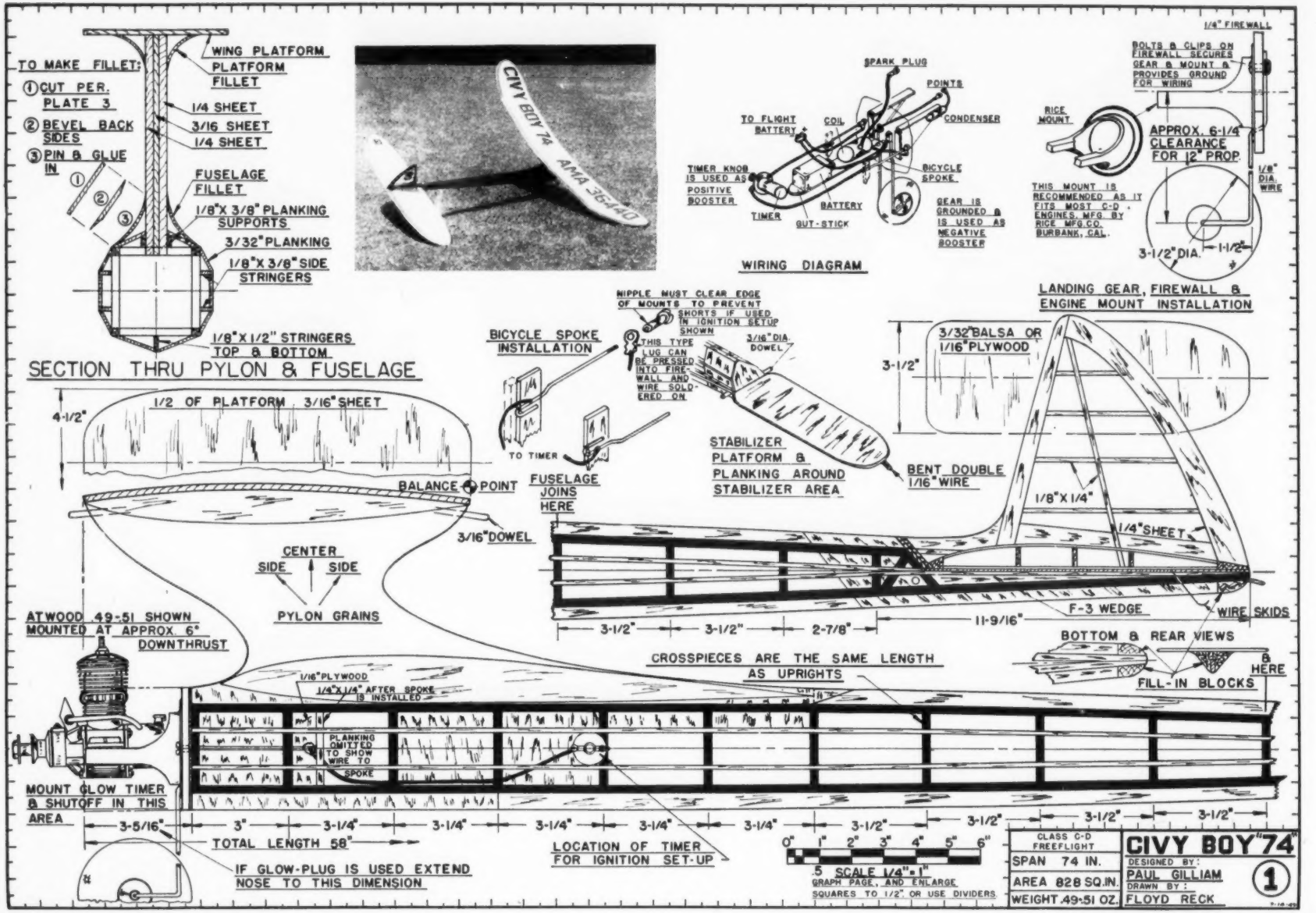
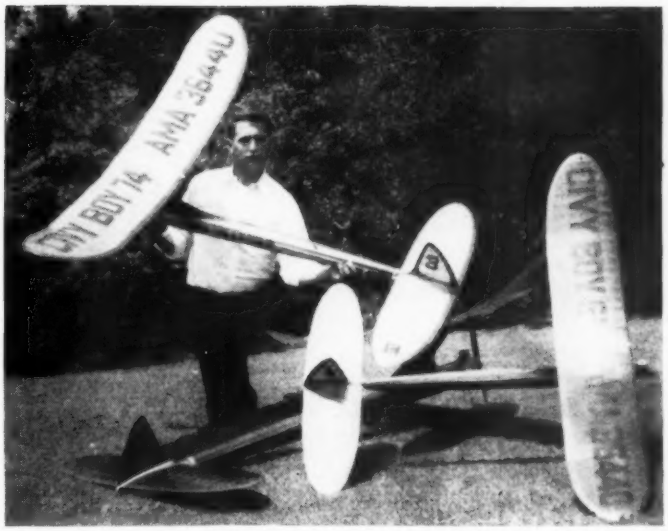


FIG. 5


TO MAKE FILLET:
① CUT PER. PLATE 3
② BEVEL BACK SIDES
③ PIN & GLUE IN
WING PLATFORM
PLATFORM FILLET
1/4 SHEET
3/16 SHEET
1/4 SHEET
FUSELAGE FILLET
1/8"X 3/8" PLANKING SUPPORTS
3/32" PLANKING
1/8"X 3/8" SIDE STRINGERS
1/8"X 1/2" STRINGERS TOP & BOTTOM
SECTION THRU PYLON & FUSELAGE
CIVY BOY 74 AMA 36-410
SPARK PLUG
POINTS
CONDENSER
TO FLIGHT BATTERY
COIL
TIMER KNOB IS USED AS POSITIVE BOOSTER
BICYCLE SPOKE
BATTERY
TIMER
CUT-STICK
GEAR IS GROUNDED & IS USED AS NEGATIVE BOOSTER
WIRING DIAGRAM
1/4" FIREWALL
BOLTS & CLIPS ON FIREWALL SECURES GEAR & MOUNT & PROVIDES GROUND FOR WIRING
RICE MOUNT
APPROX. 6-1/4 CLEARANCE FOR 12" PROP
1/8" DIA. WIRE
THIS MOUNT IS RECOMMENDED AS IT FITS MOST C-D ENGINES. MFG. BY RICE MFG. CO. BURBANK, CAL.
3-1/2" DIA.
1-1/2"
LANDING GEAR, FIREWALL & ENGINE MOUNT INSTALLATION
NIPPLE MUST CLEAR EDGE OF MOUNTS TO PREVENT SHORTS IF USED IN IGNITION SETUP SHOWN
THIS TYPE LUG CAN BE PRESSED INTO FIRE WALL AND WIRE SOLDERED ON
3/16" DIA. DOWEL
BICYCLE SPOKE INSTALLATION
TO TIMER
FUSELAGE JOINS HERE
STABILIZER PLATFORM & PLANKING AROUND STABILIZER AREA
3/32" BALSA OR 1/16" PLYWOOD
3-1/2"
BENT DOUBLE 1/16" WIRE
1/2 OF PLATFORM 3/16" SHEET
4-1/2"
BALANCE POINT
3/16" DOWEL
CENTER
SIDE
SIDE
PYLON GRAINS
1/8"X 1/4"
1/4" SHEET
F-3 WEDGE
WIRE SKIDS
3-1/2"
3-1/2"
2-7/8"
11-9/16"
BOTTOM & REAR VIEWS
& HERE
FILL-IN BLOCKS
ATWOOD 49-51 SHOWN MOUNTED AT APPROX 6° DOWNTHRUST
CROSSPIECES ARE THE SAME LENGTH AS UPRIGHTS
1/16" PLYWOOD
1/8"X 1/4" AFTER SPOKE IS INSTALLED
PLANKING OMITTED TO SHOW WIRE TO SPOKE
MOUNT GLOW TIMER & SHUTOFF IN THIS AREA
3-5/16"
3"
3-1/4"
3-1/4"
3-1/4"
3-1/4"
3-1/4"
3-1/2"
3-1/2"
3-1/2"
3-1/2"
TOTAL LENGTH 58"
IF GLOW-PLUG IS USED EXTEND NOSE TO THIS DIMENSION
LOCATION OF TIMER FOR IGNITION SET-UP
0" 1" 2" 3" 4" 5" 6"
.5 SCALE 1/4"=1"
GRAPH PAGE, AND ENLARGE SQUARES TO 1/2", OR USE DIVIDERS
CLASS C-D FREEFLIGHT
SPAN 74 IN.
AREA 828 SQ.IN.
WEIGHT 49-51 OZ.
CIVY BOY "74"
DESIGNED BY: PAUL GILLIAM
DRAWN BY: FLOYD RECK
1

CIVY BOY 74

The *Civy Boy* design is one of the most successful to come from California in a long time—try a *74* yourself!



by PAUL GILLIAM

FOREWARD—The design of a good contest ship is no accident. It requires a lot of patience and determination, to say nothing of the midnight oil. Few modelers will ever know how much time went into the actual development of the *Civy Boy*, but it was not long after the 1947 contest season that the result of Paul Gilliam's efforts gained their just reward. Contest after contest was won by the big *Civy* and its future was definitely set. Since that year many *Civies* have been built for all the contest classes and all have proven out the original theories set forth by the design in the first basic test planes.

The long moment arm and large stab area give the *Civy Boy* just about the flattest glide ever seen and also the uncanny ability to ride over the top and hang on to that last foot of altitude when riding even the roughest thermals.

I should like to mention my own experience with the *74*; after completing the model and installing the engine, I had the good fortune to have the designer with me for the original test flights. We went out in the evening in a dead calm and after a few test glides, crossed our fingers and wound up the engine. The time was set for 10 sec. and the model hand launched. The engine was turning almost full power (having leaned out somewhat from the normal test flight procedure), the ship screamed almost straight up, flipped out on the top, and settled into a perfect gliding circle, remaining in the air over four minutes. Since that flight, the only trouble I have had with the model is keeping it in sight. The construction of the *Civy Boy 74* is by no means difficult, and the average modeler should have no trouble duplicating the original ship. In addition to the record flight of Paul's original *Civy 74*, the impressive record of twelve others built is as follows: eight known First Place wins, seven Second Places, five Thirds, and numerous Fourths and Fifths. BILL ATWOOD

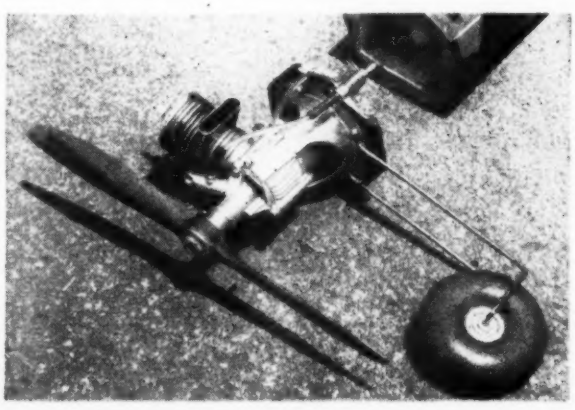
* * *

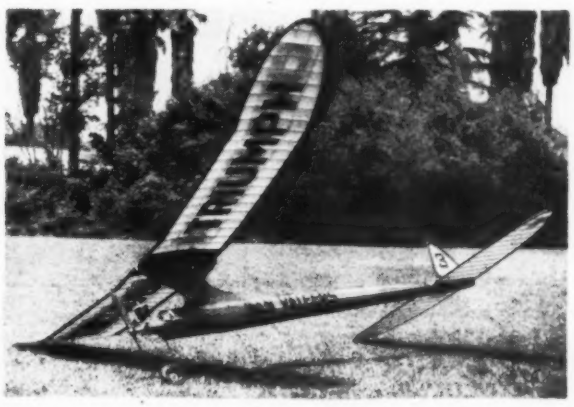
The idea that led to the design of the present *Civy Boy* was conceived in May, 1942. That year and the year before, there were few designs that could out-perform the fine *Sailplane* by Carl Goldberg. It was at this time that the author imagined a new force arrangement might do the trick. That is, a long working tail moment coupled with large per cent stabilizer area with the model's C.G. being under the trailing edge of the wing. Having entered the service June, 1942, I had to shelve the idea with only meager experimenting; the infantry soldier had little or no time for model building, so it was not until 1946, when released from service, that the first model of this design took to the air. Being a civilian once more with opportunity to build and fly, the new ship was immediately tagged *Civy Boy*.

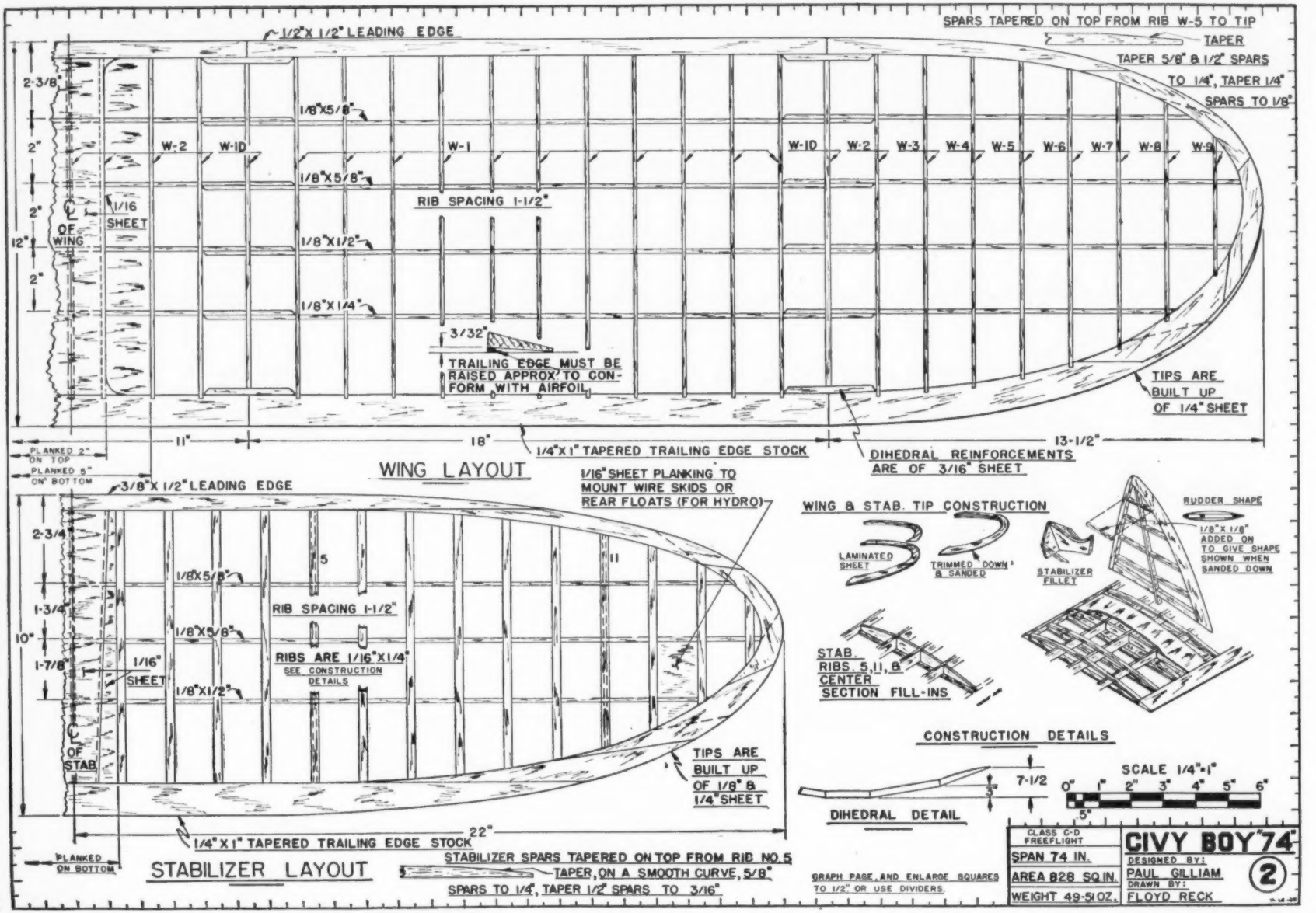
The sequence that seems to be the most rapid for building the *Civy Boy* is as follows: scale the plans to full size. The fuselage is a square box shape made from 1/4" square balsa. It is easy to build and gets its final outline shape by the use of six stringers. Before starting to lay out the fuselage sides, splice four long pieces of 1/4" square from standard 3' balsa stock for the fuselage longerons. It is best to make the splices in these four longerons so that they fall in different locations in the fuselage to give greater strength. While these longeron splices are drying, construct the pylon. From sheet balsa cut the three pylon laminations. The center is 3/16" sheet with balsa grain vertical. The two outside laminations are made of 1/4" sheet, and are placed with the balsa grain diagonally opposite the 3/16" sheet pylon center. Cement the laminations well. Place the pylon on a flat surface and pin down heavily until dry, or place something flat and heavy on it to insure against warps.

While the pylon is drying (and it is best to allow several hours for drying—or even over night), use the spliced 1/4" square longerons to lay out both sides of the fuselage box, building one side on top of the other to get absolute uniformity. Cut and cement in place the upright pieces of 1/4" square. Cut two identical pieces of pattern F3 from 1/4" sheet and

(*Turn to page* 50)






1/2"X 1/2" LEADING EDGE
SPARS TAPERED ON TOP FROM RIB W-5 TO TIP
TAPER
TAPER 5/8" & 1/2" SPARS TO 1/4", TAPER 1/4" SPARS TO 1/8"
2-3/8"
2"
2"
12"
2"
1/8"X5/8"
1/8"X5/8"
1/8"X1/2"
1/8"X1/4"
W-2
W-1D
W-1
W-1D
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
1/16 SHEET
OF WING
RIB SPACING 1-1/2"
3/32"
TRAILING EDGE MUST BE RAISED APPROX. TO CONFORM WITH AIRFOIL
TIPS ARE BUILT UP OF 1/4" SHEET
11"
18"
13-1/2"
PLANKED 2" ON TOP
PLANKED 5" ON BOTTOM
1/4"X1" TAPERED TRAILING EDGE STOCK
DIHEDRAL REINFORCEMENTS ARE OF 3/16" SHEET
WING LAYOUT
3/8"X 1/2" LEADING EDGE
1/16" SHEET PLANKING TO MOUNT WIRE SKIDS OR REAR FLOATS (FOR HYDRO)
2-3/4
1-3/4
10"
1-7/8"
1/8"X5/8"
1/8"X5/8"
1/8"X1/2"
5
11
RIB SPACING 1-1/2"
RIBS ARE 1/16"X1/4" SEE CONSTRUCTION DETAILS
1/16" SHEET
OF STAB
TIPS ARE BUILT UP OF 1/8" & 1/4" SHEET
22"
1/4"X1" TAPERED TRAILING EDGE STOCK
PLANKED ON BOTTOM
STABILIZER LAYOUT
STABILIZER SPARS TAPERED ON TOP FROM RIB NO.5
TAPER, ON A SMOOTH CURVE, 5/8"
SPARS TO 1/4", TAPER 1/2" SPARS TO 3/16"
WING & STAB. TIP CONSTRUCTION
LAMINATED SHEET
TRIMMED DOWN & SANDED
STABILIZER FILLET
RUDDER SHAPE
1/8"X 1/8" ADDED ON TO GIVE SHAPE SHOWN WHEN SANDED DOWN
STAB. RIBS 5,11, & CENTER SECTION FILL-INS
CONSTRUCTION DETAILS
7-1/2
3/8"
DIHEDRAL DETAIL
SCALE 1/4"=1"
0" 1" 2" 3" 4" 5" 6"
.5"
GRAPH PAGE, AND ENLARGE SQUARES TO 1/2" OR USE DIVIDERS.
CLASS C-D FREEFLIGHT
SPAN 74 IN.
AREA 828 SQ.IN.
WEIGHT 49-5 OZ.
CIVY BOY "74"
DESIGNED BY: PAUL GILLIAM
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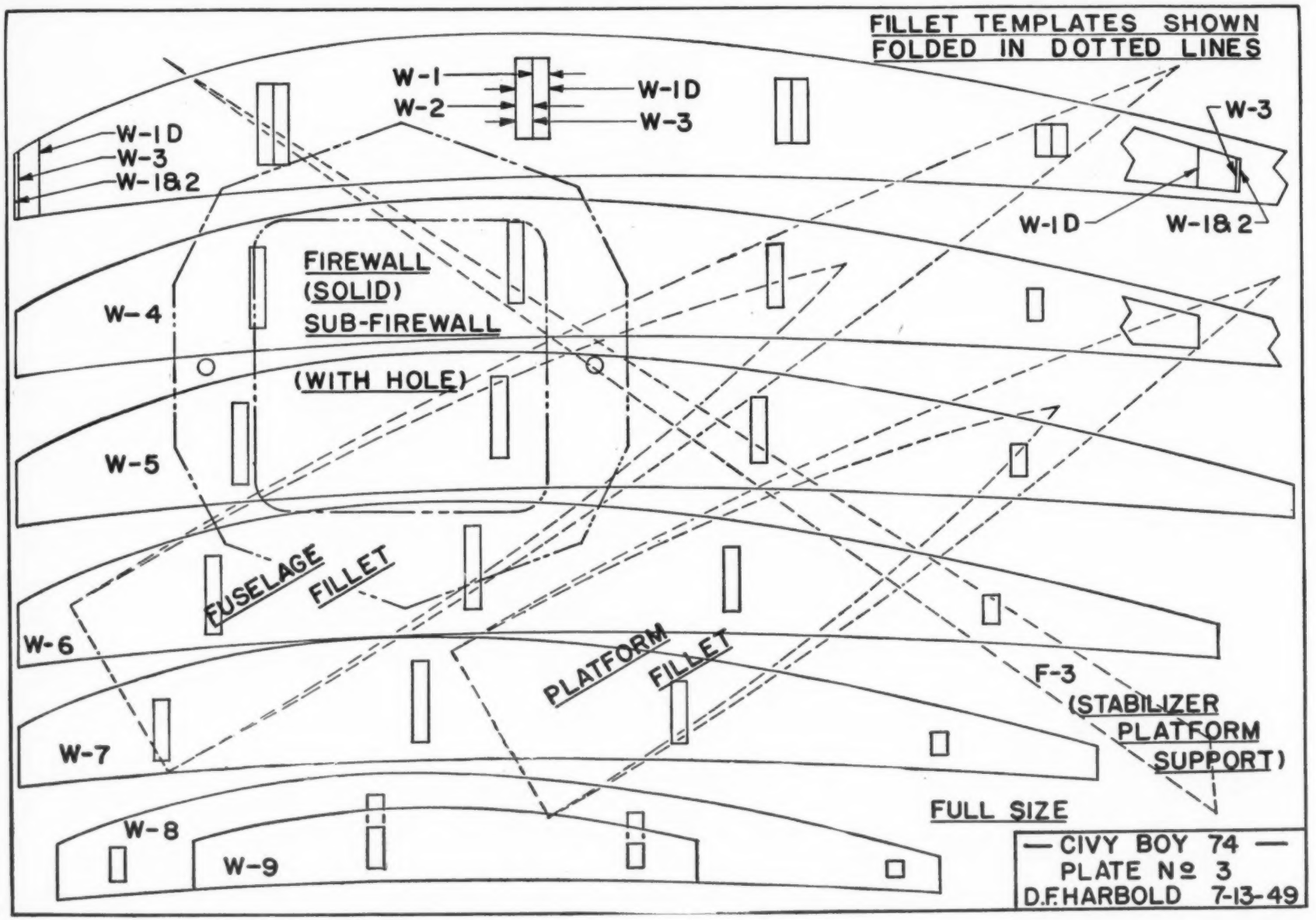
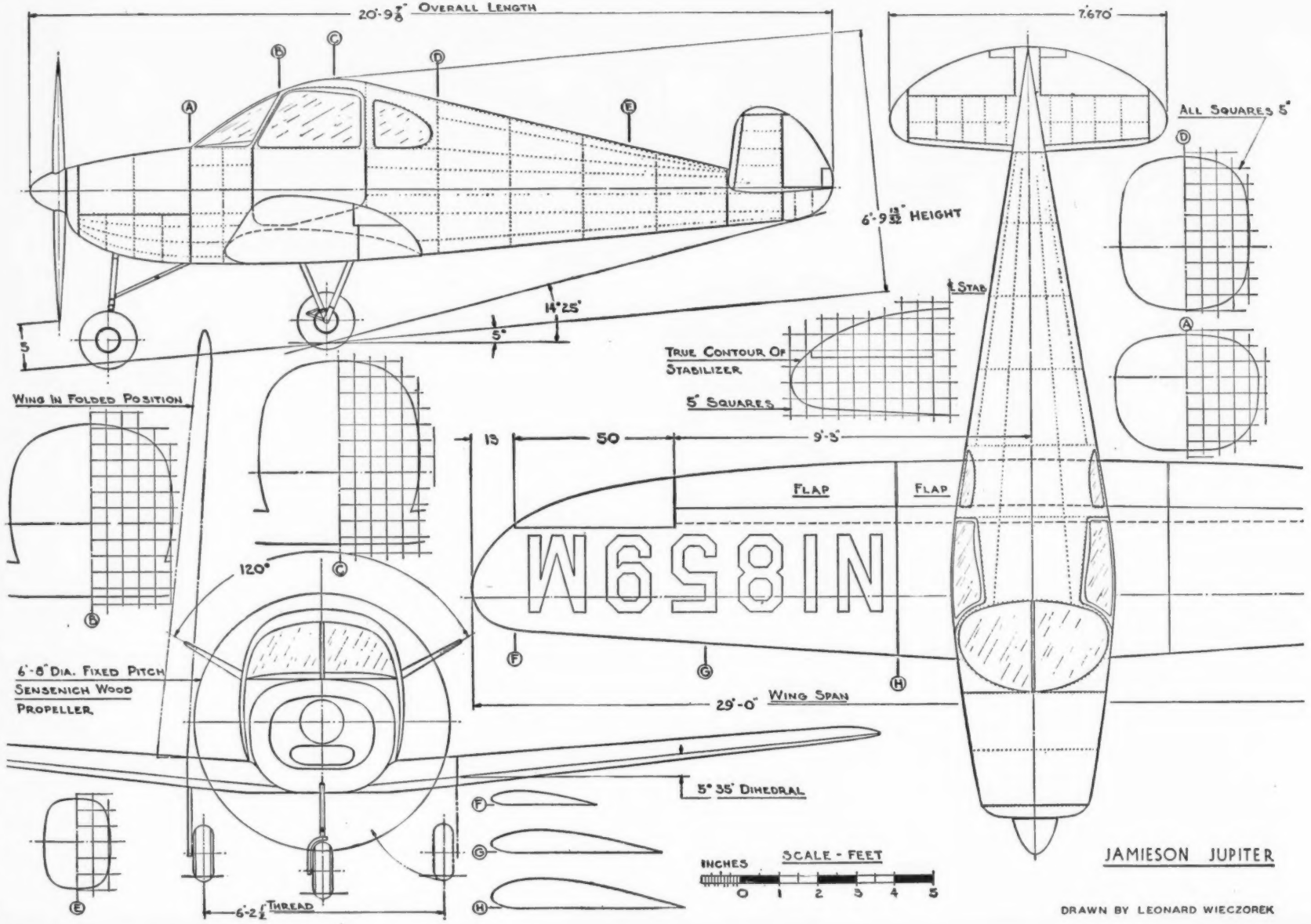
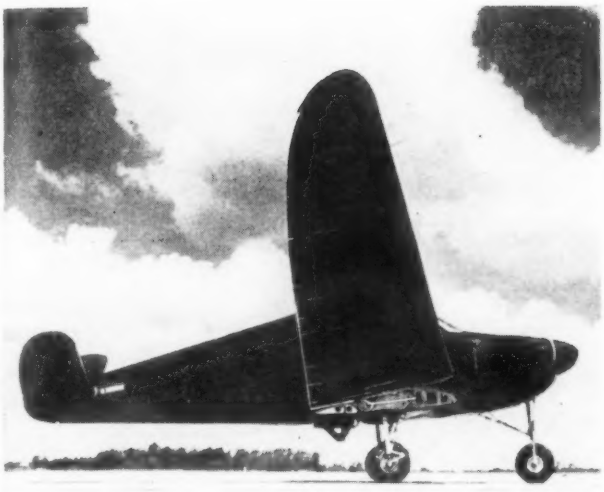
2


FILLET TEMPLATES SHOWN
FOLDED IN DOTTED LINES
W-1
W-2
W-1D
W-3
W-1D
W-3
W-1&2
W-3
W-1D
W-1&2
FIREWALL
(SOLID)
SUB-FIREWALL
(WITH HOLE)
W-4
W-5
FUSELAGE
FILLET
W-6
PLATFORM
FILLET
F-3
(STABILIZER
PLATFORM
SUPPORT)
W-7
W-8
W-9
FULL SIZE
— CIVY BOY 74 —
PLATE Nº 3
D.F.HARBOLD 7-13-49


20'-9 7/8" Overall Length
7'-6 7/8"
All Squares 5"
6'-9 13/32" Height
14°25'
5°
5
Stab
True Contour Of Stabilizer
5" Squares
Wing In Folded Position
13
50
9'-5"
Flap
Flap
N859W
120°
6'-8" Dia. Fixed Pitch Sensenich Wood Propeller
29'-0" Wing Span
5° 35' Dihedral
6'-2 1/2" Thread
Inches
Scale - Feet
0 1 2 3 4 5
Jamieson Jupiter
Drawn by Leonard Wieczorek

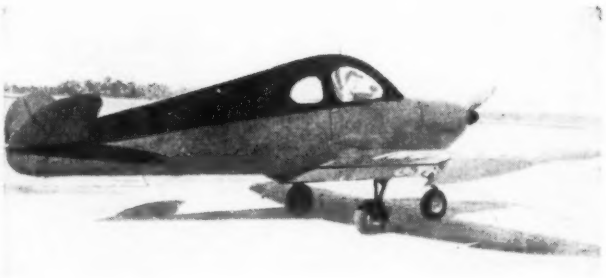


ONE of the things that characterizes the personal aircraft business is the perpetual optimism of small groups launching a new prototype and publicly announcing a modest price. Prospective owners gasp at the low price tag, wait a few months, and then get ready to fly away their production airplane only to learn that the price is up several thousand dollars over the original announcement! This usually puts the new airplane in the same price class as its competitors who, because of a larger volume, are usually able to provide more airplane for the money, particularly in the way of small detailed luxuries.

And that is why it's a little startling to hear a newcomer to the business say: "We're not fooling on that price!" and announce an all-metal, three-place, folding-wing, tricycle, retractable landing gear monoplane for *just* $2500. Like most oldtimers in the business we hope he can do it—but doubt it! And if the new Jamieson *Jupiter* does come off the line and into the dealer's hands at $2500, we'll be the first to congratulate everybody connected with this new company!

Jamieson Aircraft Company is headed by C. M. Jamieson and is located at DeLand, Florida, with manufacturing facilities on the DeLand Airport. Jamieson is a former Beech and Culver engineer and, like most designers, has incorporated the lessons learned with both companies, (which were actually one and the same), by producing an airplane remarkably resembling the Culver but equipped with the Vee tail of the Bonanza! However, the resemblance is in outward appearance only, for in

JUPITER—by Jamieson



by ROBERT McLARREN

Lightplane owners will get more than ever before, if *Jupiter* is a success

detail the new *Jupiter* is an entirely new airplane from stem to stern.

It is a low-wing cabin monoplane of all-metal construction. The fuselage is built up of 24ST aluminum alloy and is designed in three sections to simplify production and assembly. The main seat is 48" wide and seats two side-by-side, with a single narrower seat in the rear. The baggage compartment is located behind the rear seat and is designed to accommodate 120 lb. Two small children's jump seats can be located in the baggage compartment to permit taking the whole family along, provided, of course, the two little ones don't weigh more than the 120-lb. total.

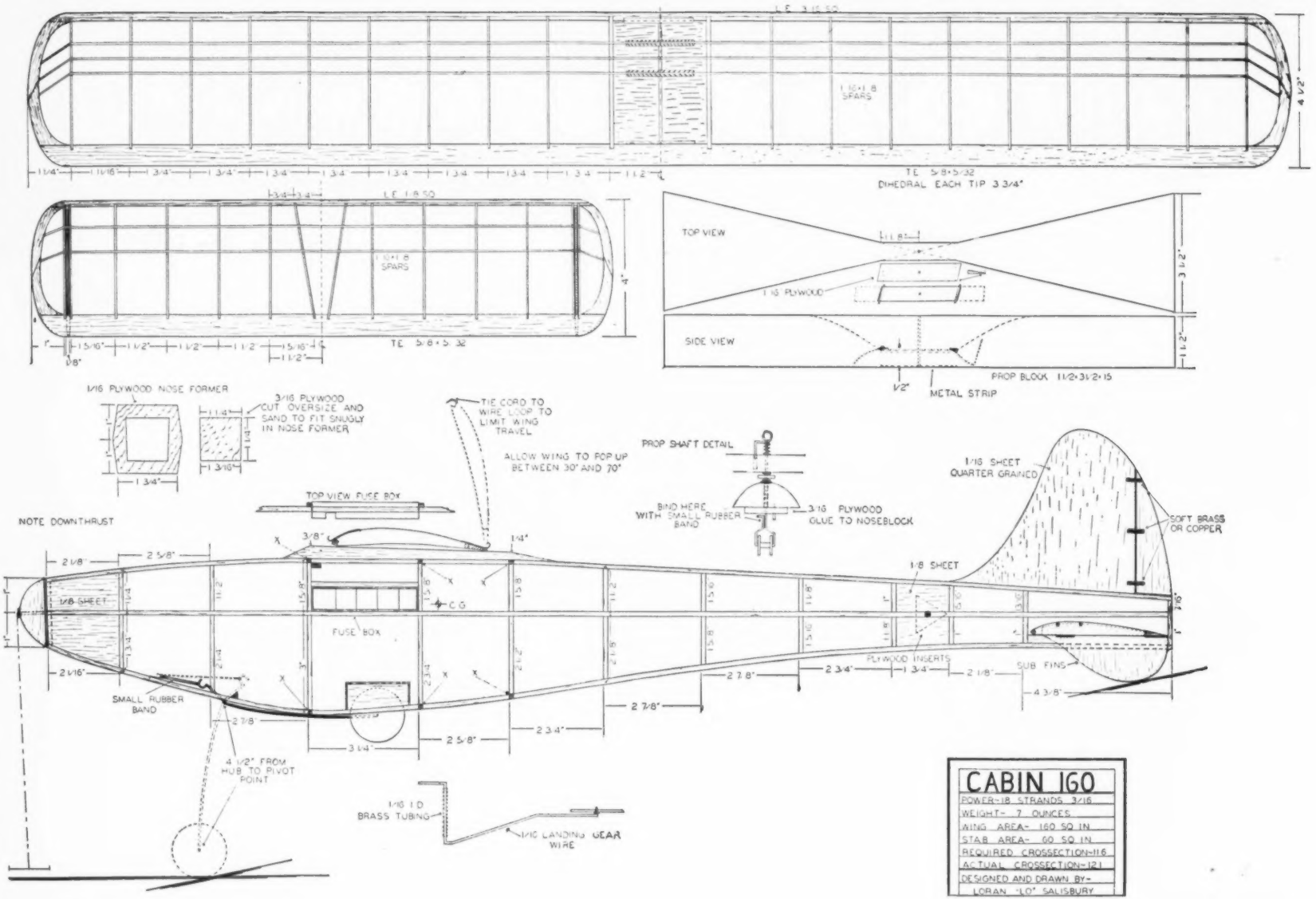
The wing is all-metal construction of 24ST built up on two main spars and pressed-flange ribs. It is equipped with a hinge mechanism just outboard of each landing gear to permit the outer panel to fold upward. Thus reduced, the storage width is only a little more than the landing gear tread. Folding is by hand, and a system of locks is used for both the up and down position.

The landing gear is fully retractable and features a nose wheel gear, which folds directly rearward into the fuselage, and main gear units that fold inboard into the wing center section. The landing gear is electrically operated, making any hand-pumping, or cranking, unnecessary. All three gears use the same 6.00 x 6 wheels and the main gear is fitted with hydraulic brakes.

The empennage is a "Vee tail" arrangement in which two surfaces are designed to do the work of three. In this arrangement, instead of having two horizontal stabilizers and elevators plus a vertical fin and rudder, two surfaces are set at a large angle to the horizontal. The controls are interconnected in such a way that both surfaces may be raised or lowered in the manner of a conventional elevator. When the rudder pedals are operated, one of these surfaces goes up while the other goes down, simulating a rudder action and providing the required yaw to the airplane.

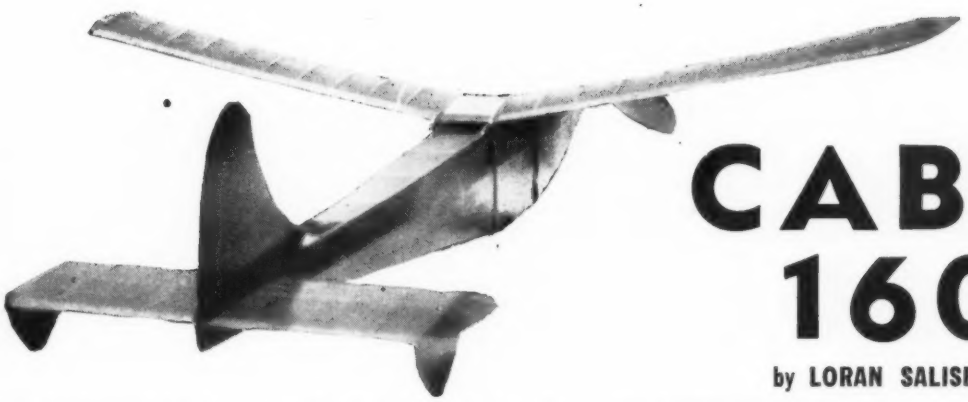
Much speculation and debate, a great deal of it quite erroneous, has been had about this type of empennage configuration. Actually, its principal advantage is simply the fact that the manufacturer only has to make two surfaces instead of three, thereby saving not only manufacturing costs, but assembly time, storage, and handling costs as well. Aerodynamically, it is an improvement in that the total area of the two surfaces is less than the conventional three and there are only two tail surface fuselage junctures, instead of three, both of which offer an opportunity for drag reduction.

(*Turn to page* 36)


L.E. 3/16 SQ.
1 1/4 x 1/8 SPARS
TE 5/8 x 5/32
DIHEDRAL EACH TIP 3 3/4"
L.E. 1/8 SQ.
TOP VIEW
1/16 PLYWOOD
SIDE VIEW
PROP BLOCK 1 1/2 x 3 1/2 x 15
1/2"
METAL STRIP
1/16 PLYWOOD NOSE FORMER
3/16 PLYWOOD CUT OVERSIZE AND SAND TO FIT SNUGLY IN NOSE FORMER
TIE CORD TO WIRE LOOP TO LIMIT WING TRAVEL
ALLOW WING TO POP UP BETWEEN 30° AND 70°
PROP SHAFT DETAIL
BIND HERE WITH SMALL RUBBER BAND
3/16 PLYWOOD GLUE TO NOSEBLOCK
1/16 SHEET QUARTER GRAINED
SOFT BRASS OR COPPER
TOP VIEW FUSE BOX
NOTE DOWNTHRUST
1/8 SHEET
C.G.
FUSE BOX
PLYWOOD INSERTS
SUB FINS
SMALL RUBBER BAND
4 1/2" FROM HUB TO PIVOT POINT
1/16 I.D. BRASS TUBING
1/16 LANDING GEAR WIRE

CABIN 160

POWER-18 STRANDS 3/16
WEIGHT- 7 OUNCES
WING AREA- 160 SQ IN
STAB AREA- 60 SQ IN
REQUIRED CROSSECTION-116
ACTUAL CROSSECTION-121
DESIGNED AND DRAWN BY-
LORAN "LO" SALISBURY



CABIN 160

by LORAN SALISBURY

THIS cabin model features a terrific climb and a simple, reliable dethermalizer; a combination which makes the model a real contest threat.

The construction is conventional except for the propeller. Selection of the wood is important if the model is to be kept to weight; use medium weight wood throughout except for the wing and stabilizer spars—these should be rather hard.

FUSELAGE. Select two pieces of firm 1/8" square stock for the top longerons and two somewhat softer pieces for the bottom longerons. Hold in place on the plan with pins. Cement in the uprights and the 1/8" x 1/4" x 4-1/8" stabilizer incidence strips. Cut the rear peg reinforcement pieces from 1/8" sheet and cement in place. Build the sides one on top of the other so that they will be identical.

When dry, remove from the plan and separate the two sides. Cut six pieces of 1/8" square wood, 2-3/8" long, and cement in place at the points marked X on the plan. Check frequently while drying to see that a perfect square is formed. When dry, bring the sides together at the rear and cement. Check by sighting from the rear to see that identical curves are formed by the sides. Cut two pieces of 1/8" square, 1-1/2" long, and cement in place at the nose. The rest of the crosspieces may now be cemented in, using the natural curve of the sides to determine their length. Add the stringers and the plywood nose former.

Cut the plywood rear peg reinforcement pieces and drill for a 3/16" dowel. Cement in place on the inside of the fuselage. A short piece of 1/8" square may be cemented above and below the stringer where the rear peg protrudes to aid in achieving a smooth covering. Plank-in the nose section and bend and install the retracting gear. Don't forget to build the box *over* the portion of the wheel which extends inside of the fuselage. This will prevent dirt from getting to the motor.

Next, cut the 3/16" plywood key for the nose block and fit it to the nose former. After drilling and shaping the nose block, cement the key securely to the back of the block.

A piece of firm 1/16" x 1/2" x 2" stock is notched into the stabilizer incidence strips to form a wide platform.

Build the fuse box from scrap 1/16" sheet and line with mica or asbestos. A cover may be made for the box but is not absolutely necessary.

Silkspan is best for covering the fuselage as it doesn't rot as badly as tissue when splattered with lube.

WING. The wing is built in two halves. Cement all the ribs in place except the center rib, and add the leading edge and tips. When dry, block up one side 7-1/2" and cement the leading and trailing edge dihedral gussets in place. Add the spars and center rib. Cover the bottom (and if you wish, the top) of the center-section with 1/32" sheet. Sand thoroughly and cement the four wire hooks to the 1/8" ribs. Bend the pop-up limiting hook and bind to the leading edge with thread.

STABILIZER. Construction of the stabilizer is self-explanatory. The use of twin sub-fins is a change from the original in order to aid take-off under the new rules.

FIN. Cut the fin from *quarter-grained* 1/16" sheet and cement in place.

PROPELLER. A prop carved by the method to be described will be of true pitch from hub to tip. The diameter is 15", pitch 20", and the approximate blade area 20 square inches.

Select a medium soft block 15" x 3-1/2" x 1-1/2" and draw diagonal lines from corner to corner as shown on the top view plan. Drill a 1/16" hole at the center (preferably on a drill press to insure perfect alignment). Draw the center portion where the hinges will go, and saw out the blank. Make several cuts in each blade with a hack saw blade to aid in clearing away the excess wood. Cut in the pitch to within 2" of the shaft hole, checking with a rule to see that a straight line is formed from edge to edge. When satisfied that the back faces of the blades are finished, cut away the center portion as shown by the dotted line on the side view plan.

Now, cut the blade shape in. I prefer a paddle blade about 2-1/8" wide. Cut the front face of the blades to an airfoil section, then you may undercamber the blades.

Cut the plywood piece which reinforces the hinges, bevel the ends as shown, and cement in place. Make the hinges from shim brass, brass tubing, and steel wire. Add the metal front piece and bind with thread. Coat thoroughly with cement. If the blades seem too soft, cover them with silk.

The shaft may now be bent and installed.

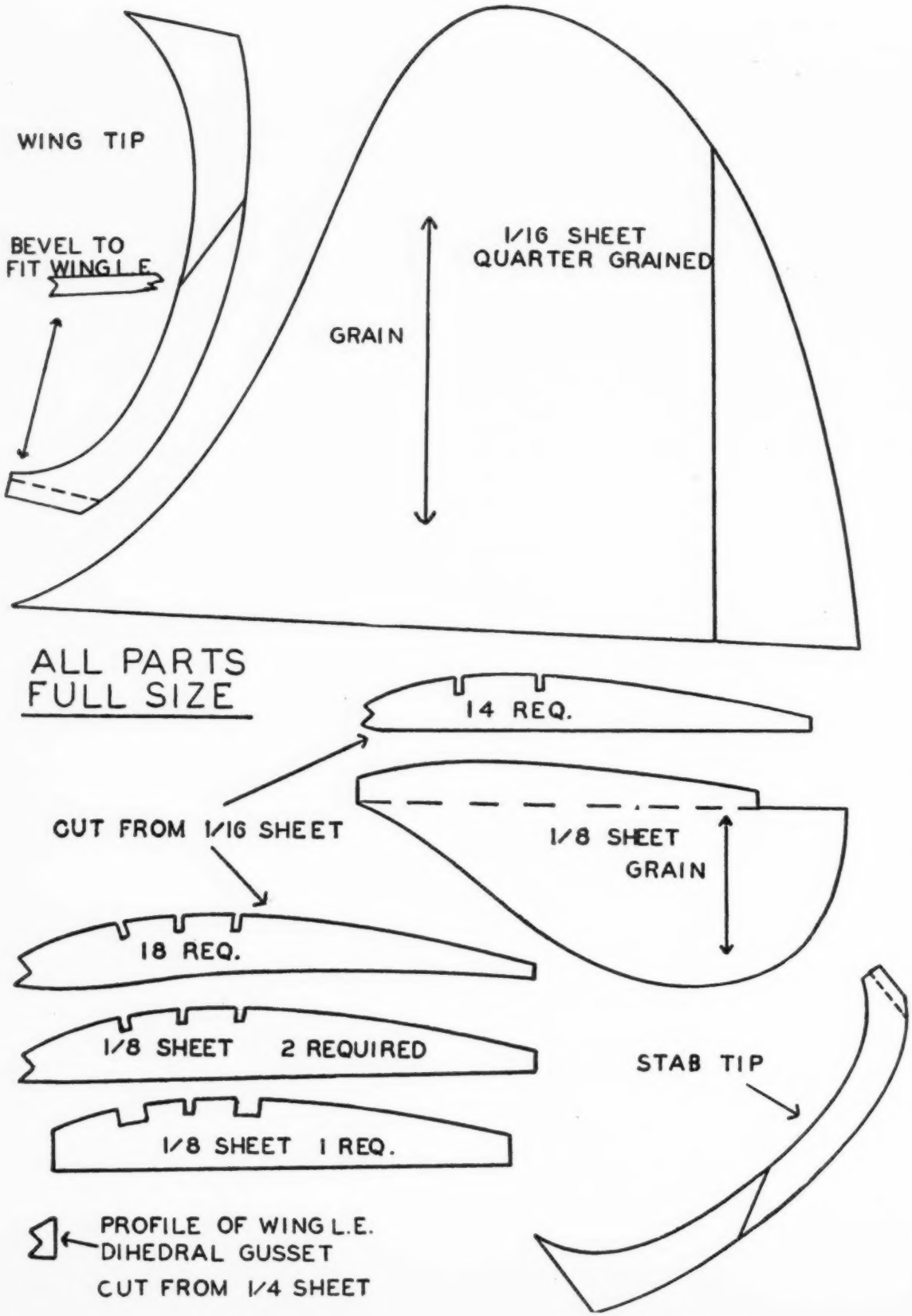
FUSELAGE. To make the fuselage, buy a small amount of salt-petre from your drugstore and obtain a ball of heavy cord. The cord should be about 1/8" dia. Cut a two foot length and place in a four ounce glass or jar. Fill with water and add 1/4 teaspoonful of saltpetre. Allow to soak for a few minutes, then remove and hang up to dry. When completely dry, mark off several one inch spaces at one end and light. The burning rate should be about 4 minutes per inch. The rate of burning can be varied by weakening or strengthening the solution. Under breezy conditions it will burn somewhat faster.

DETHERMALIZER. The fuse type, pop-up-wing dethermalizer as shown on the plan has been thoroughly tested and has proven very successful. It is so simple that little elaboration is needed. Just be sure that the cord which stops the wing at the desired angle is of sufficient strength. Kite string or nylon fishing line is suitable. The points of attachment must, of course, be as strong as the cord.

Before flying check the operation of the dethermalizer. Hook up the limiting cord and use two rubber bands looped from hook to hook to hold the wing on. The front band will pass through the fuse box. Insert a length of fuse between the strands and light with a cigar or cigarette. *If a match or cigarette*

(*Turn to page* 43)

This particular 160 is an earlier model, just like the one above but less the subfins. Lower view shows action of wing for dethermalizing


WING TIP
BEVEL TO FIT WING L.E.
GRAIN
1/16 SHEET QUARTER GRAINED
ALL PARTS FULL SIZE
14 REQ.
CUT FROM 1/16 SHEET
1/8 SHEET GRAIN
18 REQ.
1/8 SHEET 2 REQUIRED
1/8 SHEET 1 REQ.
STAB TIP
PROFILE OF WING L.E. DIHEDRAL GUSSET CUT FROM 1/4 SHEET

Note the rounded nose on this Salmson 2 A.2 and also the husky landing gear that was provided

WORLD WAR I

PART ONE

THE airplane under discussion this month is the French Salmson 2 A.2, about which little technical information has appeared in historical appraisals of World War I aircraft. Many readers of MODEL AIRPLANE NEWS will remember that the Salmson was a favorite mount of heroic pulp magazine characters who fought the first War In The Air from the front cockpit of a 2 A.2, and proceeded to vanquish scores of Fokkers with a single synchronized Vickers. Yes, for about 20 years following World War I, the 2 A.2 more than held its own in fiction, and this fiction was based on fact: the Salmson 2 A.2 was one of the best two-seaters developed by any nation during the last half of W. W. I.

Unlike many planes of the period that were above average, the 2 A.2 didn't just "happen" to get that way—whatever excellence it possessed was definitely and painstakingly planned by its builders, Societe des Moteurs Salmson.

Just as its name implies, the Salmson firm was primarily a manufacturer of gas engines. But even more than that, it was a developmental haven for men with sound engineering ideas who needed an "angel" to back development of their brainchildren. At its head was a man of great foresight—Monsieur Salmson; long before W. W. I, he was known as a great engineering employer. His ability to grasp the significance of new ideas resulted in substantial contributions to many fields of engineering.

Two of his proteges comprised the engine designing team of Canton-Unne who, at the time Salmson became interested in them, already had an impressive list of successful internal combustion engines to their credit.

At the time of their association with Salmson, the crying need of the belligerent air arms—and the aircraft manufacturers—was for more powerful engines with which to equip improved planes in the rapidly growing air war. "More power" was the cry—reliability was almost a secondary consideration. If performance could be upped to exceed that of enemy equipment, reliability could be winked at.

"We'll Build It."

It was under such conditions that the Canton-Unne team were commissioned to *see* what they could do about thinking up a new and superior engine for French aircraft. Their joint effort was somewhat startling—it was an engine which, on paper, was just what was needed to put French aviation in the fore. The only trouble was, it was such a radical departure from the accepted configuration for aircraft engines, that not one plane existed or was even contemplated which could use it!

Developmental work on the new engine went ahead during 1916. By the end of the year it took its initial production form, a nine-cylinder radial water-cooled affair variously identified as the Salmson 9Z or the C.U. 9Z (for Canton-Unne). The engine used a number of basic patents held by Canton-Unne.

When confronted by this new mechanical apparition, the French Air Ministry was somewhat taken aback, they had hoped for something more conventional to fit in existing planes. When an Air Ministry spokesman pointed out the simple fact that an engine was no good if it didn't fit a plane, it is said that Salmson replied, with his usual energy: "If nobody has such a plane, then we'll build it."

Salmson's aeronautical engineering specialists were prepared for the action that followed. Salmson, it is said, had spent huge sums of money financing the private investigations of his aero engineers. They had perhaps dreamed of their "ideal" airplane, but had never built one. And so the results of these private investigations into aerodynamics and detailed aircraft engineering, combined with the best practice of the day, resulted in the 2 A.2., which ranked with the best in its class until the end of the war.

Design Considerations.

Admittedly, outward design of the 2 A.2 was greatly influenced by the British Sopwith *1-1/2 Strutter*, the hottest Allied two-seater in the air at the time the Salmson was on the drawing boards. The Sopwith *Strutter* was admirably performing a wide variety of combat duties, and the French had expressed their favor by purchasing hundreds of them. It is no wonder then, that it became the general pattern for the 2 A.2.

The 2 A.2 was intended for use as an Army cooperating type, to carry out any one of several jobs as required. In this respect it was intended to take up where the Sopwith *1-1/2 Strutter* left off, and carry on to meet advanced specifications.

This was accomplished, briefly, by utilizing the Salmson 9Z engine of 270 rated hp (just double the power of the Sopwith) and by adding only 760 lb. to the fully loaded weight of the Sopwith (2040 lb.). In addition, the Salmson reflected a great deal more thought towards streamlining, reducing the load per hp, and only slightly increasing the wing loading.

The concentration of the 9Z's weight led to a short nose and long tail moment arm, typical of rotary engined aircraft, and condusive to ease of maneuverability. Continuation of the engine's circular shape through the cockpit section of the fuselage made for a roomy interior, for installation of a variety of gear. Separation of the cockpits providing exceptional fields of view for both pilot and observer, and enhanced the Salmson's field of fire as well.

Simplicity keynoted the construction otherwise. Designed

(*Turn to page* 38)

A camouflaged Salmson on its way toward the lines

by ROBERT C. HARE

Model Prop Design

IN the 14 years since the first gas model churned itself into the air, model designers have come a long way; the contrast between yesterday's lumbering boxcar and today's sleek, screaming spindizzy is as impressive as that between the T-Ford and the V-Ford. Better porting, higher compression ratios and hot fuels have doubled and tripled the power of the engines with no increase in weight, while progressive modelers, by careful design and meticulous streamlining, have evolved the ships to keep pace with them.

Model propeller design, however, seems to have spent this time just jumping up and down in the same place. Aside from vague recommendations by the engine manufacturer, the modeler still lacks any workable rule of thumb to guide him, and relies chiefly on past experience, intuition, and the traditional cut-and-try method to produce a satisfactory propeller for each new model. Such a hit or miss approach makes it impossible, except by luck, to find propellers precisely suited to each set of operating conditions.

This is a serious handicap in securing peak performance. An oversize propeller holds down the engine speed and prevents it from running at full power, while one that is too small will also reduce power by permitting overspeeding. Nor is this all; even though the prop may be of the correct size, any errors in pitch setting will cut down its efficiency and thus curtail the useful power available. Propellers designed by the "intuition" method are likely to include both these faults, exacting a heavy toll in wasted power.

The long neglect of this vital problem is due chiefly to the formidable mathematics involved. It is possible for a persevering modeler to dig up test reports which are directly applicable to his own work, but any attempt to utilize them soon leaves him wandering in a maze of nightmarish calculations.

The three factors governing propeller design are: the horsepower, the rpm at which the horsepower is developed, and the airspeed. A change in any one of them will alter the propeller requirements, and each will have a different effect. Aeronautical engineers have developed a useful mathematical expression which takes account of all these variables in the same proportion that they affect the propeller, but its solution requires the use of logarithmic tables with which very few model builders are familiar. This equation, upon which all propeller design charts are based, is known as the "speed-power coefficient"—usually abbreviated to "C_S". For sea-level conditions it is used in this form:

$$C_S = \frac{.638 \times \text{mph}}{\sqrt[5]{\text{hp}} \times \sqrt[5]{\text{rpm}^2}}$$

Where: C_S = Speed-power coefficient; mph = Airspeed, miles per hour; hp = Horsepower; and rpm = Revolutions per minute.

One of the fundamental tools of propeller design, this $9.98 expression must be solved anew for each propeller problem; but the fact that it cannot be handled by ordinary arithmetic makes it a real stumbling block to the modeler. Fortunately, this complex equation is easily dealt with by means of a nomograph; a device which may be new to some readers. The use of this "poor man's slide rule" is simple, requiring only a pencil and straightedge to find the C_S in a few moments.

Suppose we have on the drawing board a class B job to be powered by a *Forster* .29. From past experience with similar models, this ship is expected to fly at 60 mph. Taking the hp and rpm from power curves furnished by the manufacturer, we have: Rpm = 13,400; Horsepower = 0.40; and Estimated top speed = 60 mph.

With this data in hand we turn to the nomographic chart, Fig. 1A, to solve for the C_S. Locating 13,400 on the rpm scale at A, and 0.40 on the hp scale at B, we draw a line connecting them and not the spot where this crosses the index line at C. Next, we find 60 mph on the airspeed scale at D and draw a second line, through D and C, down to meet the speed-power coefficient scale at E, where the C_S is read as 1.03.

The next step is to refer to the design chart, Fig. 2. (Aerodynamics students will no doubt observe that this chart has been considerably simplified. Since model airplanes are designed for only one flight condition, the essential data can be presented on a skeletonized chart which is much less confusing to beginners.) The newly found C_S is spotted in on the bottom of this chart at point A. From here we draw a vertical line to meet the pitch ratio scale at B, and note the reading on the scale at this point—0.65 in this case.

FIGURE 1.

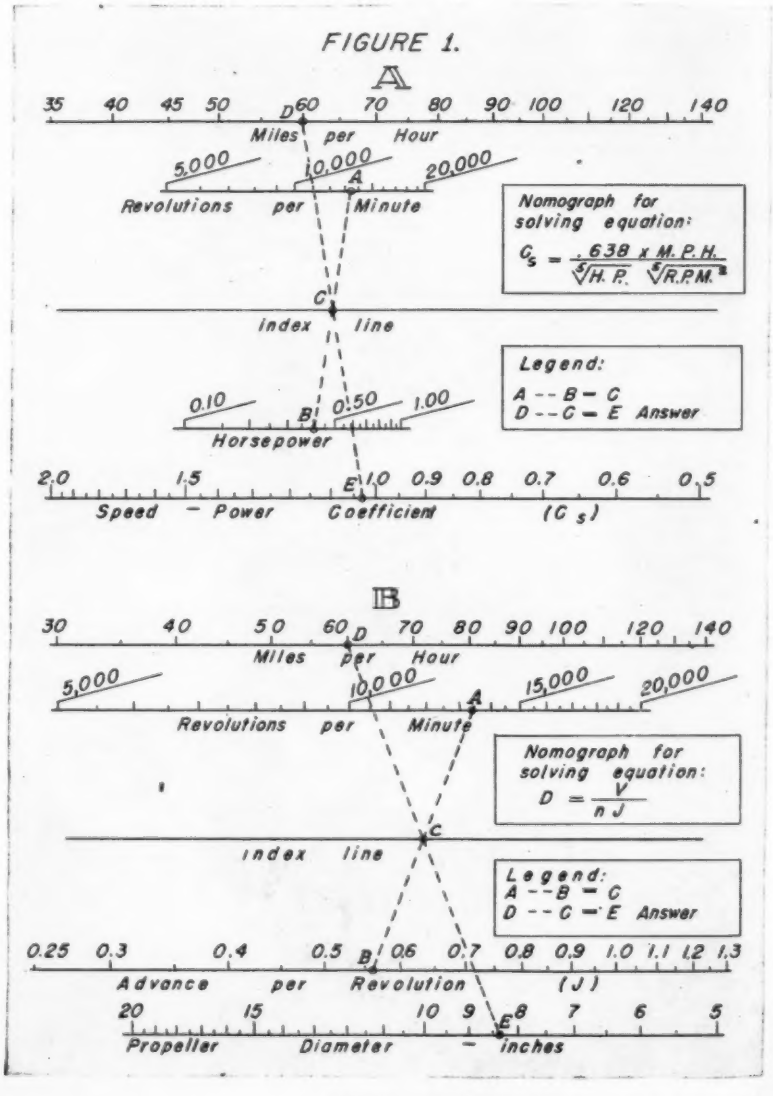

A
35 40 45 50 D 60 70 80 90 100 120 140
Miles per Hour
5,000 10,000 20,000
A
Revolutions per Minute
Nomograph for solving equation:
$C_S = \frac{.638 \times M.P.H.}{\sqrt[5]{H.P.} \sqrt[5]{R.P.M.^2}}$
C
Index line
Legend:
A -- B -- C
D -- C -- E Answer
0.10 0.50 1.00
B
Horsepower
2.0 1.5 E 1.0 0.9 0.8 0.7 0.6 0.5
Speed - Power Coefficient (C_S)
B
30 40 50 60 D 70 80 90 100 120 140
Miles per Hour
5,000 10,000 15,000 20,000
A
Revolutions per Minute
Nomograph for solving equation:
$D = \frac{V}{nJ}$
C
Index line
Legend:
A -- B -- C
D -- C -- E Answer
0.25 0.3 0.4 0.5 B 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3
Advance per Revolution (J)
20 15 10 9 E 8 7 6 5
Propeller Diameter - inches

FIGURE 2

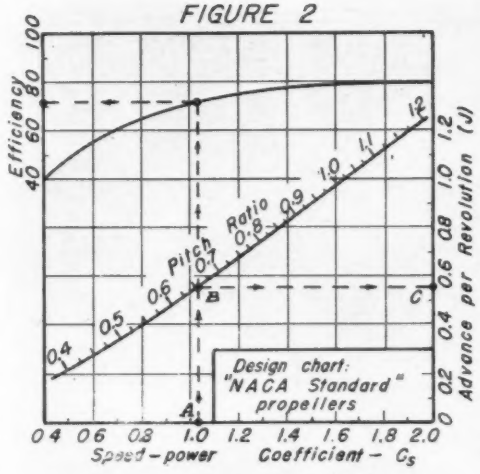


FIGURE 3

FIGURE 4

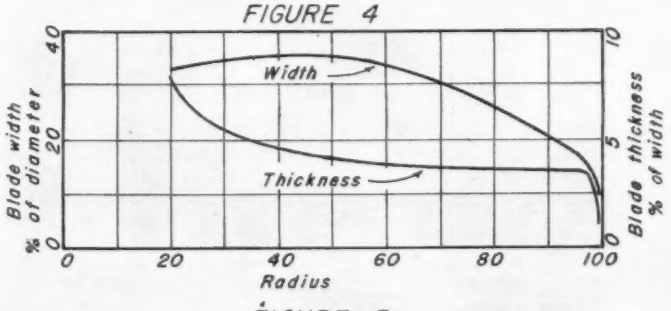
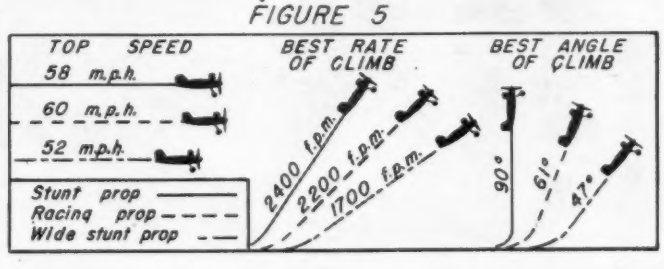


FIGURE 5



by CHESTER HODGKINS

A horizontal line is laid out from B to the right hand edge of the chart, where the advance per revolution (J) is read at point C as 0.56.

This new factor will permit us to solve directly for the propeller diameter and, incidentally, has a real physical significance. It is essentially a measure of how far the propeller moves forward with each revolution, in terms of its diameter. Thus—in level flight—if J = 0.5 the propeller is pulling itself forward one-half its own diameter every time it turns over; if J = 1.0 it is progressing one diameter per revolution, etc.

When J is known, the diameter may be found by using the formula: $D = \frac{12\ V}{n \times J}$

Where: D = Propeller diameter, inches; V = Airspeed, feet per second; n = Revolutions per second; and J = as above.

While only simple algebra is involved here, it requires the conversion of airspeed and rpm to feet per second and revolutions per second, a tedious and inconvenient process.

For rapid calculation, a second nomograph has been provided in Fig. 1B. This is used in the same manner as before. The rpm and the factor J are located at A and B, and a line is drawn from one to the other crossing the index line at C. A second line is laid out from the airspeed (point D), through C to intersect the diameter scale at E, where the propeller diameter is found to be 8.4".

To obtain the pitch, the diameter is simply multiplied by the pitch ratio of 0.65, which you may remember was picked off the design chart at point B in Fig. 2. A diameter of 8.4", multiplied by 0.65, gives us a pitch of 5.45". The results can be rounded off to the nearest quarter inch with no appreciable loss of accuracy, so the final figures may be taken as 8-1/2" diameter, 5-1/2" pitch.

If a three-bladed prop is desired, the C_s is obtained for two-thirds of the actual engine horsepower. The data used in Fig. 1A would then be: Horsepower (0.40 x 2/3) = 0.27; rpm = 13,400; and Airspeed = 60.

When this is worked out, it gives us a two-bladed prop of 7.60" diameter, absorbing only two-thirds of the engine output. By adding a third blade, we have a smaller propeller capable of handling the full horsepower. Four-bladed props are found in the same way, by using one-half the rated power in the calculations.

These charts may be used over and over to provide tailor-made propellers for any engine-airplane combination, but there is one important limitation. The design chart—Fig. 2—was based on test results with a family of propellers all having the same pattern of blade width and thickness, and differing *only* in pitch. As might be expected, this means that the chart is not strictly accurate except for similar propellers.

A typical propeller blade of this form is illustrated in Fig. 3, and the width and thickness curves on which it is based are plotted in Fig. 4. The Clark Y airfoil section is used throughout. After settling on the correct diameter and pitch, these curves should be referred to in laying out and carving new propellers in order to secure maximum efficiency. While it is true that almost any well-shaped propeller will be just as effective, design charts exist for only a few blade shapes. Matching your prop to the chart is a lot more sensible than working it out to please the eye and then shopping around for a non-existent chart to fit it.

For the many modelers (including the author) who take a dim view of carving propellers out of solid stock, it is possible to side step most of the labor by buying ready-made props of the desired pitch. The diameter can then be trimmed if necessary, and the blades shaped and sanded to suit.

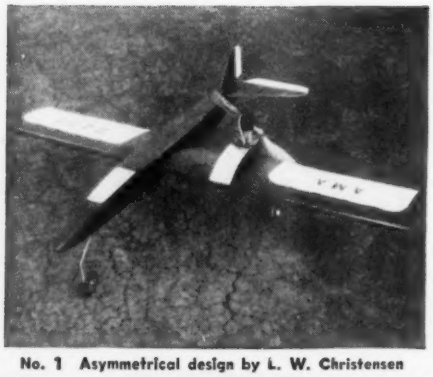
For the benefit of the curious, an efficiency curve is included in Fig. 2. To find the propeller efficiency a vertical line from the C_s is extended upward to meet the curve in the upper part of the chart, and then carried out horizontally to the left hand edge. By way of example, this has been done for the propeller under discussion; the efficiency in this case is 72%. A further increase of 1 to 3% is possible if the hub sections are enclosed in a spinner, with the greatest gain appearing at high speeds.

It should be noted that this is not the curve of a single propeller; it represents the peak efficiencies of a series of test propellers designed for various flight conditions, and the curve of any one of them touches it at only a single point. Thus, if our propeller has to operate at a higher or lower C_s (i.e., if the model proves faster or slower than expected) its efficiency falls away from this curve, and the model will perform better with another propeller designed for the new C_s. Therefore, if the flight tests differ from the estimated speed by more than 5 or 10%, the design calculations should be repeated and a new propeller furnished to match the known flying speed.

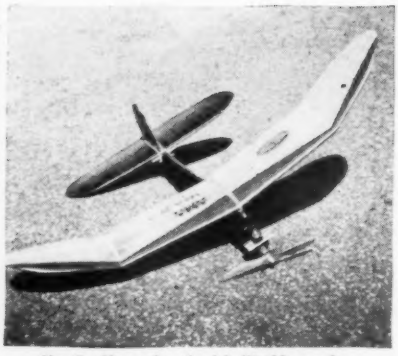
This point is especially important for stunt and free flight models, where performance is gauged by climbing ability rather than top speed. When an airplane climbs fastest, it is usually flying at about two-thirds of top speed, so in all cases where rate of climb is of first importance the propeller should be designed accordingly. If our model were intended for stunting rather than racing, for instance, an airspeed of 40 mph (two-thirds of the maximum) should be substituted in the calculations. Horsepower and rpm, of course, remain the same.

The C_s of a stunt propeller based on

(*Turn to page* 43)

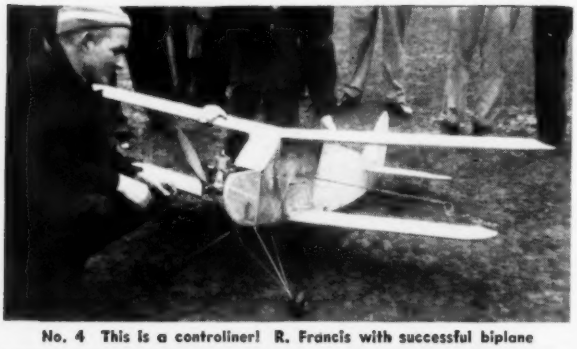


No. 1 Asymmetrical design by L. W. Christensen

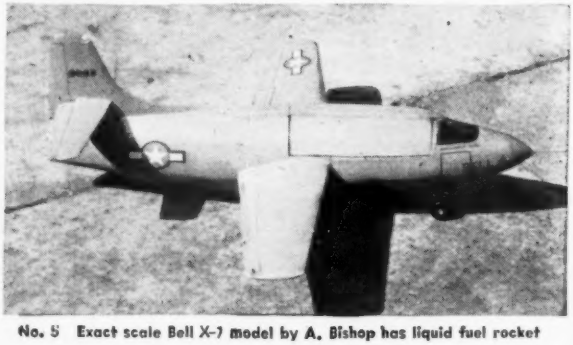


No. 2 Henry Lansford built this gassie

No. 3 Hal Roth with Wakefield job



No. 4 This is a controliner! R. Francis with successful biplane



No. 5 Exact scale Bell X-1 model by A. Bishop has liquid fuel rocket

Air Ways

News of Model Airplane Experimenters From All Over the World

No. 6 M. B. Tidmore built this scale model Stearman N2S3

NATIONALS FEVER. As this is being written, the Nationals is only a week ahead and frantic activity is underway in all parts of the country, not only to get models built and tested in time for the meet, but in promoting ways and means of *getting to* the event. Many are the jalopies being repaired or rebuilt with tender care, in the hope that they will stand up under the strain of an overloaded trip to Olathe. We hope they *all* make it. For a report of how many did, read pages 10-12 of this issue.

No sooner are the Nats over, and with only a brief breathing space between, than the Plymouth Internationals will burst out at Detroit, with more hundreds of builders traveling about. Of course, entrants to the Plymouth Meet are transported to the event free of charge. It is too bad that more Nats entrants cannot have their transportation thus arranged for. Perhaps the top prize at many of the larger meets to be held around the country should be transportation to the Nationals' site. Human nature being what it is though, such a prize should be awarded as a certificate and not in cash! Otherwise the "trip to the Nationals" would probably soon be soaring over the winner's local flying field in the form of a flock of new engines!

Since it appears likely that the Navy will sponsor Nationals Meets, in the near future at least, and will offer their facilities at Naval Air Stations for these Meets, perhaps the Navy would agree to offer transportation certificates as Meet prizes. The winners would then have to travel only to the nearest large commercial airport, or Naval Center, if available, to be picked up by the Navy and transported to the Nats. Well—it's a nice dream, at least!

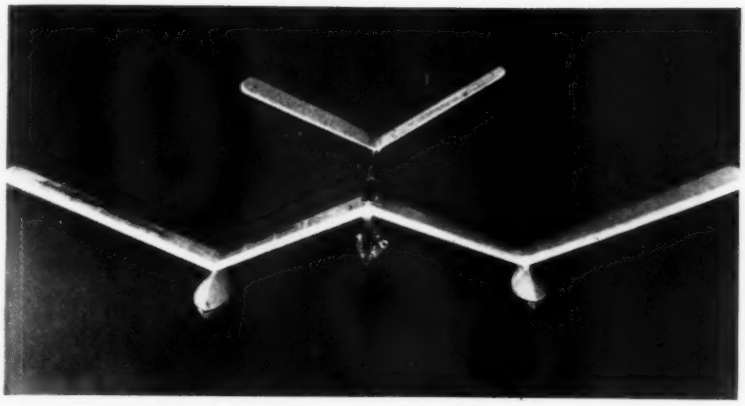
WAKEFIELD REPORTS may not be available in time for this issue, but right NOW is the time to start planning for the 1950 Wakefield Eliminations.

As is often the case in Wakefield planning, the inevitable hitches arose at the last minute and difficulties were apparent in some of the Regional Meet scheduling, publicity for such Meets, raising of money to finance the trip to Europe, and so on. At least some of these headaches could be reduced or eliminated in 1950, if planning starts right now.

In case you haven't heard, the American Team this year consists of Andy Petersen, of Burbank, Calif.; Ed. Lidgard, of South Bend, Ind.; Warren Fletcher, Elmhurst, N. Y.; Joe Boyle, Jr., of Hampton, Va.; Ed Naudzius, of Highland Park, Mich., and Bob Hanford, of Burbank, Calif. Even as this is written, however, it is still a bit uncertain whether all the Team can make the trip.

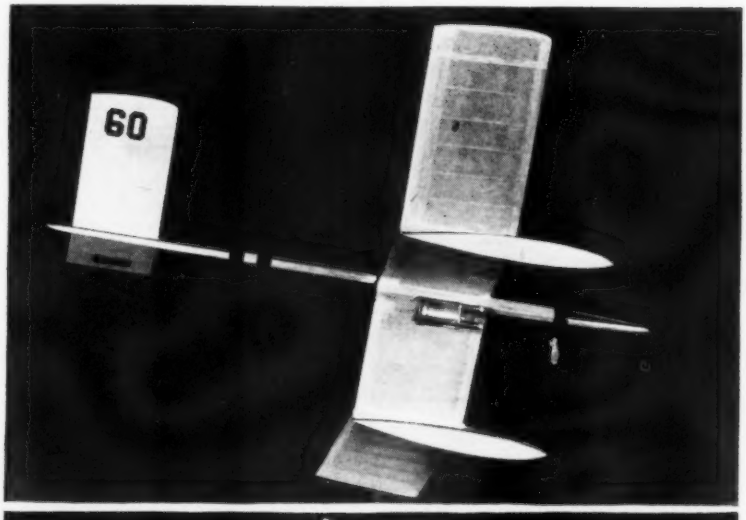
Last year there was no time to hold Regional Eliminations, and the only possible alternative, holding a final Wakefield Elimination at the Nationals, was followed. Needless to say, this brought cries of protest from modelers all over the country, who were unable to get to the Nats, and hence to try for the Wakefield Team. This led to the establishment of Regional Eliminations for 1949, but even this system has its faults. Presumably, there are a large enough number of Regional meets held, so that a modeler, no matter in what part of the country he may live, will only have to travel a few hundred miles at most to get to the nearest such meet.

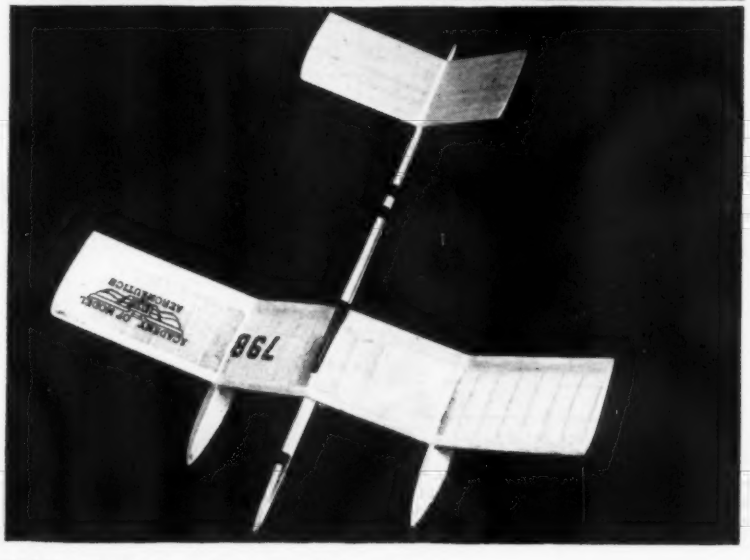
Even so, and presuming that the best Wakefield builder in each region won his local elimination meet, the U. S. A. is still not guaranteed the best possible team to represent it at the Wakefield Finals. It seems quite possible to have two or even more Wakefield fliers residing in the same locality, but even though they may all be far better at this activity than anyone else in the country, only (*Turn to page* 46)



Water Bug

by FRANK EHLING





WHILE flying this model, you will have a chance to get away from tiresome running over dry fields and hunting in the "tall grass" in which they always tell you to test new models. Once this ship is on its own, it will be easy to see when it lands, as it will float as light as a cork.

The *Jetex 100* provides power and is a welcome change from winding rubber motors and cranking balky engines. Set the drawing board up, tear out the plan, and in a few hours you will be ready to fly this little *Water Bug* and enjoy all the flights your *Bug* will make.

Since the fuselage is easy, it is a good place to start. Cut the nose boom out and round off as shown on the plan, checking to see that it is kept flat on top where it cements to the wing, and on the bottom where the jet holder is screwed in place. The jet may have to be moved fore or aft to achieve balance, so it will be wise to leave a longer flat area on the bottom which can be carved round later. The tail boom can be carved next and cut out to conform with the wing. Sand these parts well and give several coats of dope, as the model has to be completely waterproof.

The stabilizer follows and should be cut out as the plans show. Sand to a streamline shape, cut it apart in the center, and cement the halves together with the correct dihedral. After the stabilizer is dry, the tail boom can be set up in a simple jig and the stabilizer cemented in place; check to see that the cement does not draw the stabilizer out of line while drying.

To build the wing, first cut the 26 ribs out of 1/16" sheet. The wing is made in two parts, a right and a left. Lay down the leading edge of one side along with the trailing edge and cement the ribs in place, checking to see that they are straight, as they will show up in the finished model, if not. Add the wing tips of soft balsa and carve to shape. Cut the wing at the float point and put the necessary blocks under the wing ends to form the dihedral shown. Then make the other panel, but be certain you have made one *right* and one *left*.

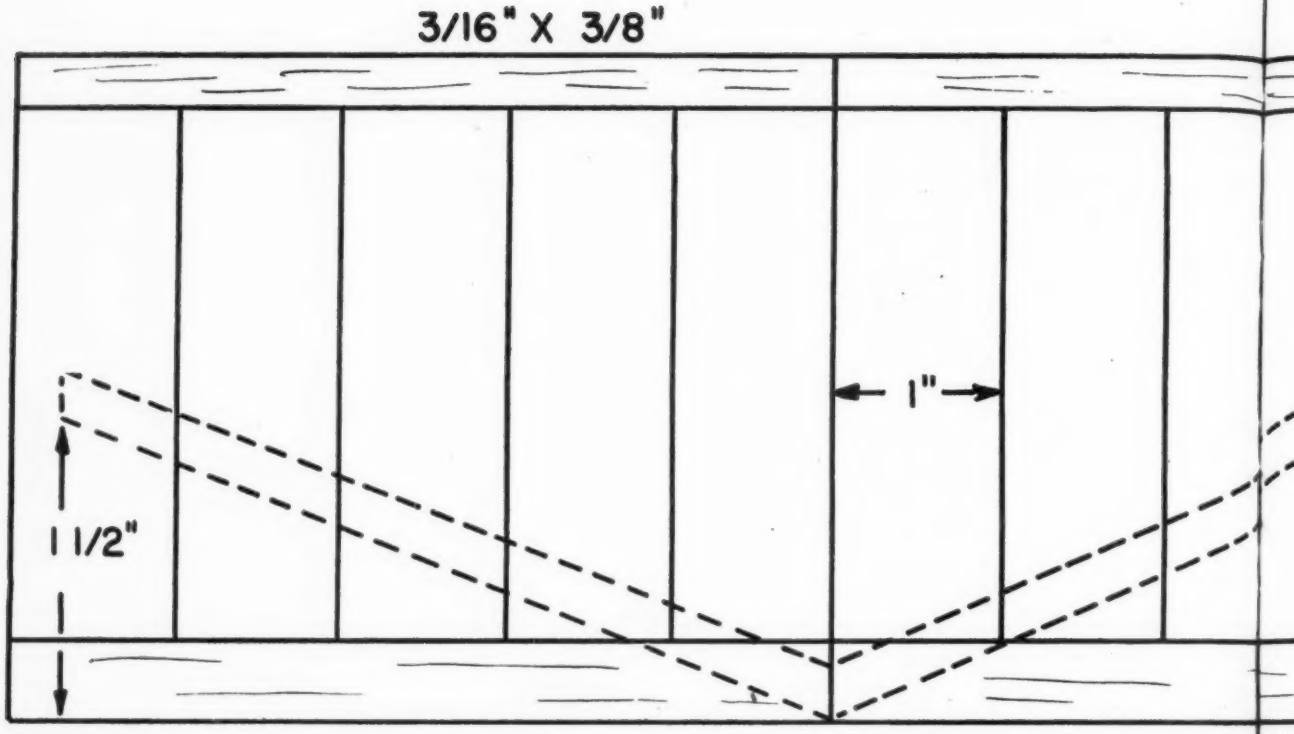
After the two panels are cemented together, the wing is covered with tissue. The booms can then be cemented in place; the tail boom is cemented on top and the nose boom on the bottom.

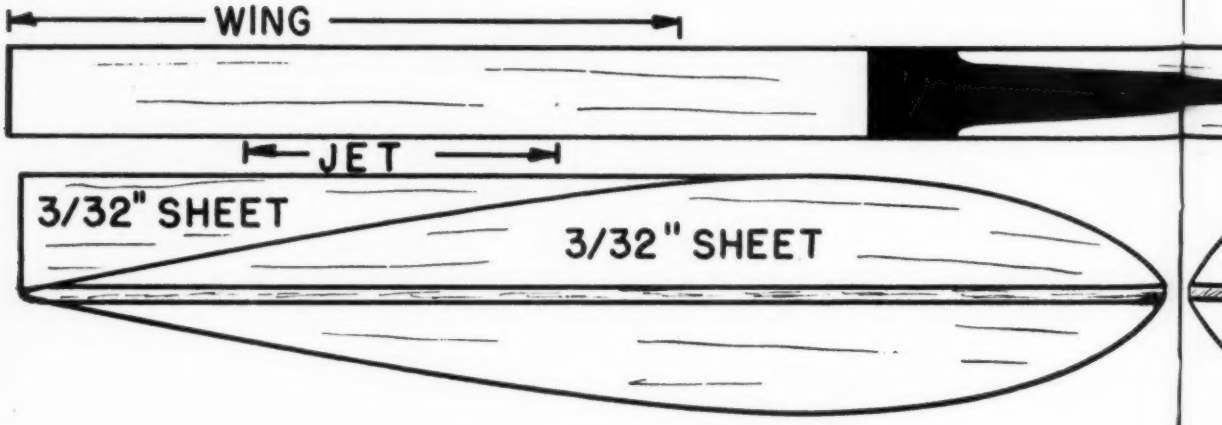
The floats are easy to make and cover. To start with, cut out 8 rib-like sections and cement 4 of them around a 3/32" square balsa strip, sanding any rough edges. Make two of these. Since the floats will be used to land on, and the model may not always land on water, they should be covered with a heavy grade of Silkspan. Cut 2 float supports out of 3/32" sheet and cement to the floats. After they are dry, the assemblies can be cemented to the wing.

The entire model is now ready to dope. As the *Water Bug* will often get very wet, and must be able to get wet and not fall apart, it will have to be doped well. Regular dope often draws up the paper too tight, so it will be wise to add a little caster oil to make the dope flexible. In this way, the dope will still be waterproof yet will not warp the model out of shape. A couple of drops per ounce of dope should be enough.

The model is glided with the *Jetex* loaded and held temporarily in place with scotch tape. The jet may be moved forward or to the rear to gain proper balance. After you have obtained a flat glide, the fuel charge can be cut in half; this will give less power and slow down the flight of the model for test purposes. To adjust for a turn, bend the edges of the stabilizer up or down near the tips. After the model is flying smoothly, the full charge can be loaded.

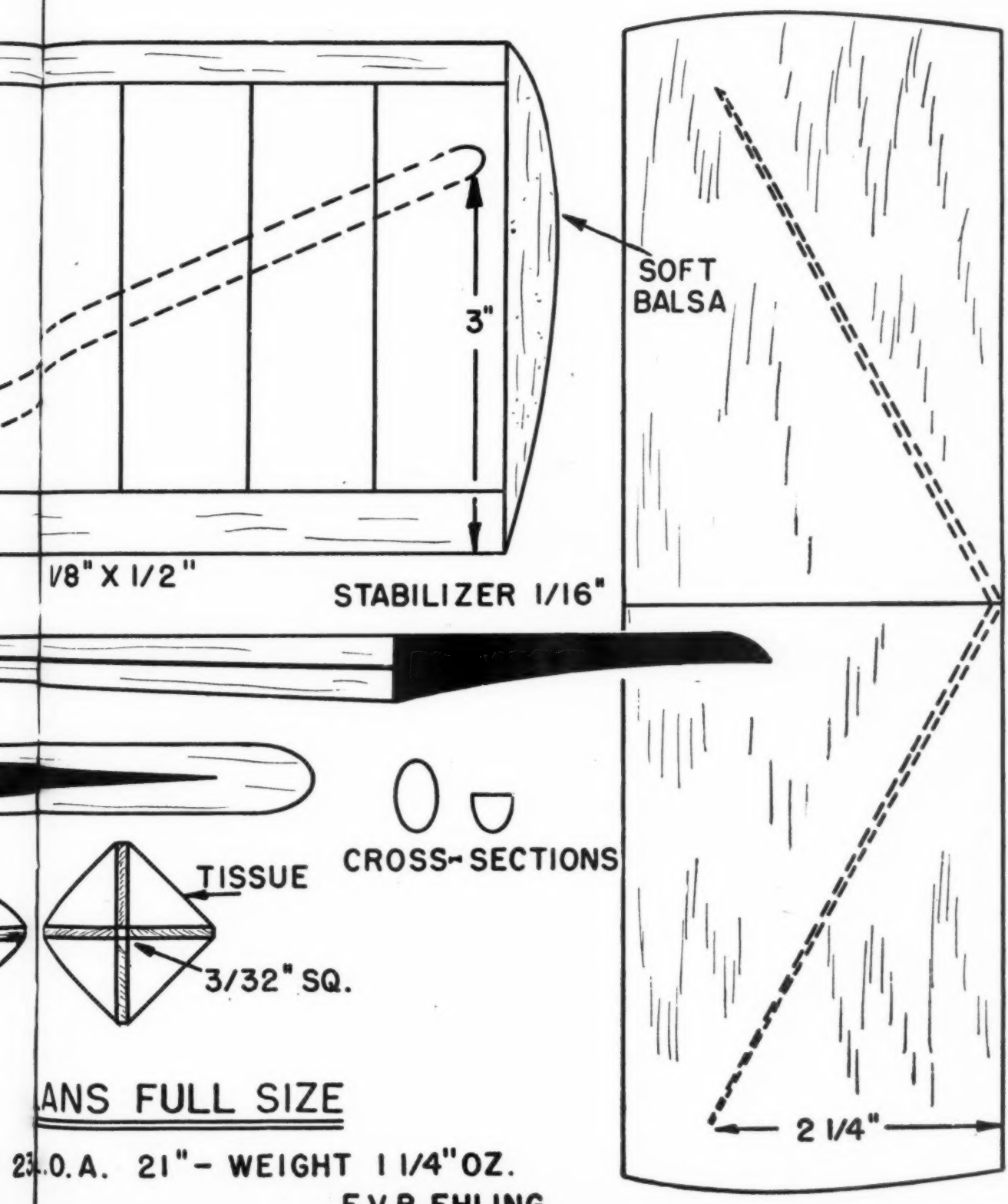
(*Turn to page* 42)





RIB TEMPLATE
1/16" SHEET

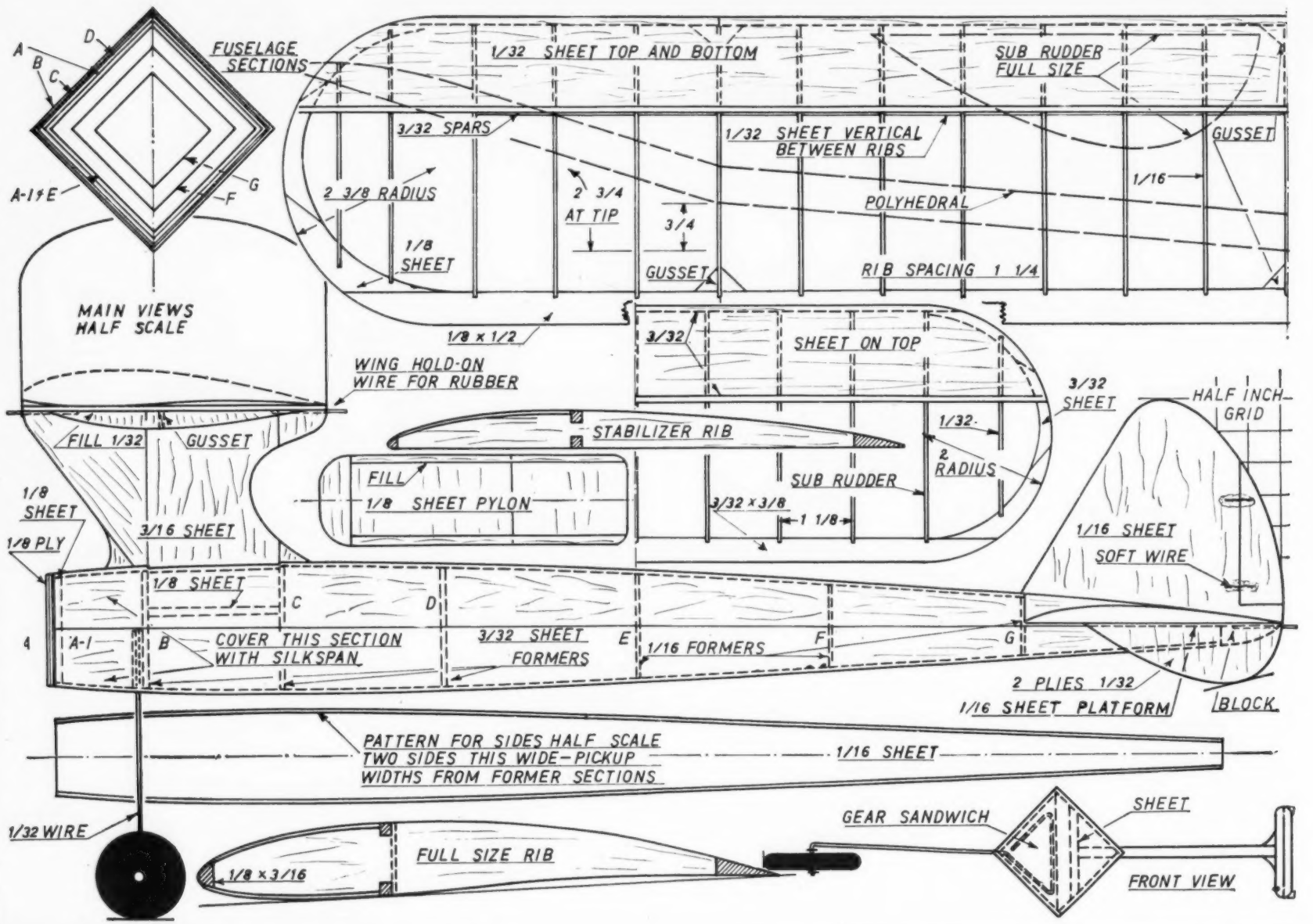
SPAN 23.0



ANS FULL SIZE

23 .O.A. 21" - WEIGHT 1 1/4" OZ.

F. V. B. EHLING


A
B
C
D
FUSELAGE SECTIONS
A-1
E
F
G
MAIN VIEWS HALF SCALE
1/32 SHEET TOP AND BOTTOM
SUB RUDDER FULL SIZE
3/32 SPARS
1/32 SHEET VERTICAL BETWEEN RIBS
GUSSET
2 3/8 RADIUS
2 3/4 AT TIP
3/4
POLYHEDRAL
1/16
1/8 SHEET
GUSSET
RIB SPACING 1 1/4
1/8 x 1/2
3/32
SHEET ON TOP
WING HOLD-ON WIRE FOR RUBBER
3/32 SHEET
HALF INCH GRID
STABILIZER RIB
1/32
2 RADIUS
FILL 1/32
GUSSET
FILL
1/8 SHEET PYLON
SUB RUDDER
3/32 x 3/8
1 1/8
1/8 SHEET
1/8 PLY
3/16 SHEET
1/16 SHEET
SOFT WIRE
1/8 SHEET
C
D
4
A-1
B
COVER THIS SECTION WITH SILKSPAN
3/32 SHEET FORMERS
E
1/16 FORMERS
F
G
2 PLIES 1/32
1/16 SHEET PLATFORM
BLOCK
PATTERN FOR SIDES HALF SCALE
TWO SIDES THIS WIDE—PICKUP
WIDTHS FROM FORMER SECTIONS
1/16 SHEET
1/32 WIRE
1/8 x 3/16
FULL SIZE RIB
GEAR SANDWICH
SHEET
FRONT VIEW

The Firecracker

by BILL WINTER

FOR "half class A" with the *O.K. Cub* furnishing power, the *Firecracker* is the result of several weeks' intensive building and experimenting with these interesting baby-engined jobs. Principal objectives were good flight time, ease of adjusting, freedom from warps, and maximum strength without a weight penalty, and a high order of stability. This, truthfully, is largely a matter of mixing known facts with one's flying experience. The notion that anyone can produce a world beating airplane is archaic, plane reputations frequently being made by the designer's skill in flying them in contests. The most one can hope for is an easy to fly, viceless, high performance machine.

How well does the *Firecracker* meet these requirements? After many test flights in the still air of evening it became apparent that the *Firecracker* will do from 2:30 up, on 20 seconds engine run, with the *O.K. Cub*—subject to props, fuels, and similar factors. A great many flights ended somewhere between 2:30 and 3:45. Most effective flights that were not influenced by conditions, were a 55-second hop on a five-second motor run, and 4:15 (when it hit wires) on 25 seconds. A few flights did last longer but it was assumed that risers had been encountered. While these are not spectacular times, they are still-air times taken late in the evening, and are a yardstick of an airplane's worth. It will occur to fans of the racing-engined .60 classification that a *Cub* job must get exceedingly high, in little time, and then glide like blue blazes to rack up comparable durations. That the *Firecracker* is such a hot airplane—and it increases by a substantial margin any duration the writer has had out of his bigger airplanes—is mostly due to the extraordinary pep of its power plant. Of course, a few other considerations also have their affect.

The *Firecracker* was developed simultaneously with another pylon ship of about the same size (for foreign consumption), *Baby Spitfire*-powered, which provided an excellent opportunity for comparing the effects of pylon height on turn, duration, and adjusting. The other pylon differed from the *Firecracker* in that the pylon itself was 3/4 inch lower, Vee-dihedral was used, and the fuselage was streamlined by the use of a circular cross section. A two-wheel gear was fitted, whereas the *Firecracker* has but one wheel (which the reader might want to retract to get still higher time), and two small sub-rudders for ground stability. Flown with the same fuel and the factory-supplied prop, the *Baby Spit* job had roughly a comparable performance but its characteristics were quite different. An extensive study had been made of wing areas for that ship and the experience was carried over to the development of the *Firecracker*. It is felt that this wing area analysis, while representing a mean of everyone's experience, is, after the power of the engine, primarily responsible for the good performance.

A graph was worked out with wing areas reading vertically from nothing to many hundreds of square inches, and with engine displacements reading horizontally from left to right, from .02 for the *Infant*, up to .60. Now it is no secret that areas have always been larger in proportion on small airplanes than on big ones. For instance, under the old rules (changed late in 1947), so-called minimum area jobs became mighty rare as displacements went down. Good Class A models frequently had at least an extra 50 square inches tacked on to permit control and good glide. Under those rules an *Infant* job, had such existed in those days, would have qualified with an area of 23 square inches and a weight of 1.6 ounces! On the other hand, as plane size increased, minimum airplanes became reasonable, especially in Class C (of '46), where the wing would be allowed a minimum of close to 700 square inches.

With such models in mind, a point was established on the graph for the old minimum area C job. For the present-day *Infant*, another point was made for a 75 square inch minimum. When these points were connected, a line resulted that gave "hot" airplanes all across the board. In some cases, particularly in A, these jobs would be too hot for comfort. To establish a line for maximum areas for good contest performance, 120 square inches was plotted for the *Infant*. Then, since the big ships vary so in area, a study of several successful .29 jobs of various designers, resulted in 500 square inches. Connecting these two points, and extending the line on up into the big ships, gave maximum good-performance areas. Further, a reasonable compromise area line was drawn, beginning with 100 square inches for the *Infant*. For the *Fire-*

(*Turn to page* 39)

Bill prepares to "light" the *Firecracker*. These illustrations were made with an early wing; final wing had sheeted leading edge

Fig. 1 The author holds the small R. C. model described in this article

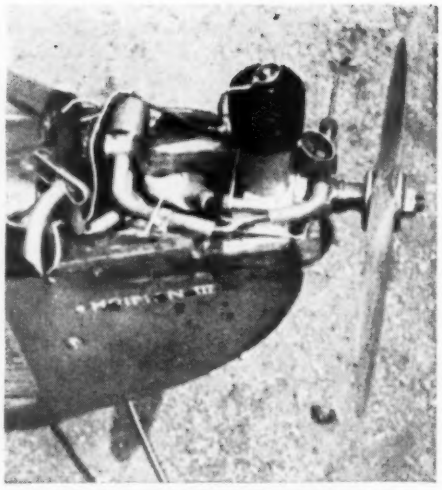


Fig. 2 Motor compartment. Glow ignition is used

Radio Control Reliability

by H. H. OWBRIDGE

RELIABILITY is far more important to radio control than to any other phase of model flying. Chasing a free flight model over hill and dale is an indication of success. With a radio controlled model it would indicate that something slipped!

Reliability is made up of several factors. Naturally we cannot expect 100 per cent reliability in model flying. What we are interested in here are some factors that will increase the over-all reliability of the model so as to obtain more flying time between repairs. "Utility factor" is what the airlines call it.

The beginner usually finds it difficult to obtain a high degree of reliability when starting out in R.C. Radio control is more complex and requires more attention to detail in order to keep things operating properly. It takes time to get used to the idea that radio control must be treated as a higher class of hobby in order to make things work at all. Unreliability can get very tiresome. It's not that the ship is completely washed out in a crash; this seldom, if ever, happens. We have one airplane in particular that has moved a lot of dirt on this earth and it's still flying, but what gets tiresome is the continual repairing it takes to keep the model airworthy. After some 400 flights with four airplanes, we are just beginning to realize that a lot of this minor damage can be avoided.

There was a time when we thought that all we needed for reliable radio control was a reliable receiver. That was before Bill Nuckolls showed us how to operate an RK61. After several flights with an RK61 that never missed a signal, we realized mishaps were still happening. The usual frequency was about one minor accident in every 8 or 10 flights. To describe and analyze every accident would fill a small book. Suffice it to say that between the engine, the receiver, the transmitter, the batteries, the fuel system, the wiring, the installation details, the airframe and, last but not least, the pilot—there are plenty of combinations for single and multiple failure unless things are watched pretty closely. This may sound like the whole idea of radio control is impractical, which of course is not the impression intended. One thing it takes though is the experience to detect a point of possible failure and the patience to stop and fix it before flight. This alone will go a long way to reduce the number and severity of accidents. But the number will still be considerable per hundred flights. If we could either reduce this figure to one minor accident in 20 or 30 flights or build the airplane to absorb, without damage, more of the rough treatment that every radio controlled job gets, the "fun factor" would certainly benefit. Depending on many things, sooner or later some kind of failure will occur. A typical and very common example is when a landing is forced to be made down wind. The reason might have been pilot error, engine malfunction or one of any number of things. One way to decrease accidents is to cut the amount of control equipment to the very minimum and then simplify the type of flying by supercautiousness. This is *not* a good solution. Simple maneuvers soon become tiresome to both pilot and spectator. The fact is that we can't completely eliminate accidents, but we can do a lot to counteract for them.

Since radio control is a hobby and is governed by all that the word "hobby" implies, the only practical road to reliability is simplicity. Any other approach will most surely demand too much of the things that a hobby cannot supply such as weight, size, money, and complexity. Compare, for instance, the reliability we would like to have with that of a full size airplane and the method in which it is obtained. A classic example in the big ship field is twin ignition; two sparks are put where one will do, just to make doubly sure that the cylinder fires and fires well. The larger the airplane, the more this doubling up process is carried on as a substitute for reliability. All major systems in the airplane have stand-by systems ready to take over if the primary one fails. We cannot use these tactics in model work. With the extra weight aboard, the first instance of pilot error in flying would leave very little worth picking up off the ground. However, in model work, we have one very useful substitute for reliability and it should be used for all it's worth in radio control—this substitute is *ruggedness.*

The more correct term for ruggedness is strength/weight ratio. The more the strength and the less the weight, the more the ruggedness. Of course ruggedness is not increased merely by removing weight. More often a model needs some weight added, but this weight must be added in the form of important structure, not more control equipment. Assume that we can remove five ounces of control equipment weight from the model without sacrificing too much radio control. The model immediately becomes stronger, so to speak, because it has less weight to support not only in flight but (of even more importance) on landing. Non-structural weight never held a model together, it simply tends to break it apart.

Further improvement could be gained if part of the five ounces were put back to increase the strength of important structure. Theoretically, we can even do better than this. Compactness is closely related to ruggedness. As models are built, a 5′ ship is stronger than one of 6′ span. So, in the above example, if we were to build a smaller model at the new gross weight, it would be even more rugged. Anyone who has flown very large and very small models has noticed this scale effect. It is largely due to the fact that the smaller model has the simpler structure. Its strength is built into fewer, but relatively larger, pieces of wood. Also some material sizes are not scaled down to the smaller model. Wing and fuselage covering are often the same thickness as on the larger model. Then too, the general laws of stress

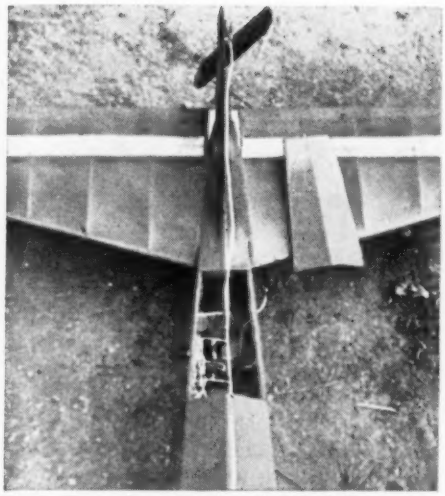


Fig. 3 The receiver compartment includes battery space

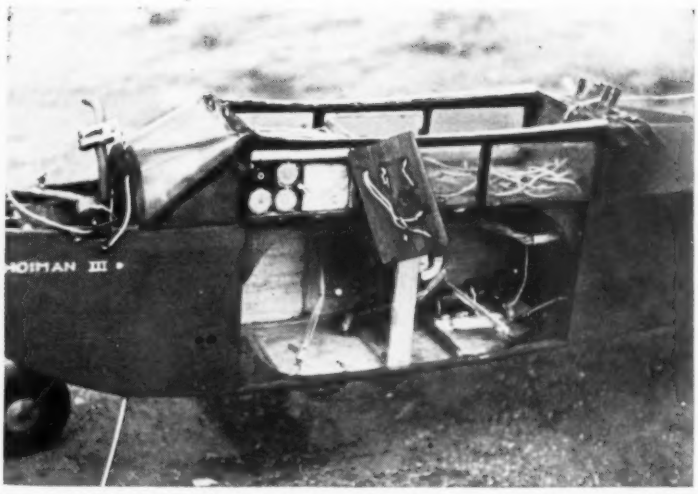


Fig. 4 Control panel uses simple homemade switches that have proven to be very reliable

and strain are in favor of the smaller, more compact structure. Consequently, if we want reliability but can't keep those rough landings from occurring now and then, the design policy for radio control should be—build 'em rugged.

Let's discuss some facts and figures. The model shown in Fig. 1 is not what we consider a final design but it approaches the theme of this discussion closely enough to serve as an example for criticism. Span is 4-1/3' and gross weight is 2-1/4 lb. Wing loading is 12.86 oz. per square foot. Span and loading are about right, but the fuselage is too narrow for good accessibility, which in turn is related to reliability. The model is quite fast because of its M6 wing section and flat trim. The speed is handy for penetrating winds, but in the future we may forsake this in favor of lower landing speeds. The landing gear is fixed rigged which is wrong. A very hard landing would either bend it or wipe out structure. The next design will have a rubber band shock absorbing gear that will allow fold back under extreme loads without breakage. The advantage of a tricycle gear still remains doubtful as we view it.

Fig. 2 shows the engine compartment. The *Ohlsson 19* glow plug engine gives plenty of power. (That's not a high tension lead to the plug but a dress snap and wire to the old booster battery plug-in.) Needless to say, the change from spark ignition to glow plug has been a large factor in increasing reliability. The object on the left side is an electro-magnetic check valve and is part of the experimental fuel system. This valve (and a few other non-electrical items) provides two speed engine, normal cut-off and safety cut-off on glow plug. This fuel system is a long story and may be covered in a later article.

The engine compartment structure is not what it could be for ruggedness. For nose-in landings (that break the propeller) it might be better if the whole volume under the engine were filled in with a balsa bumper block that would transfer the loads to a wider area of the fire wall and aft structure.

Fig. 3 shows the receiver compartment. Access doors are all right but since this receiver needs so little attention after the pre-flight check-out, we may delete this large door in future designs and resort to wing removal. This goes for the receiver only. Other items like batteries should be much more accessible. The receiver is the *Aerotrol* form, using the RK61. The rubber band mount is an accepted standard and very near perfect, but a slack cable (of wire or heavy cord) should tie from the receiver to some strong point aft to prevent violent forward motion and subsequent recoil of the receiver in a very hard landing. This idea seems better than sponge rubber bumpers because it requires less room.

Opinions of this receiver are probably pro and con. It is much like an engine. You have to live with it and learn its symptoms before you can really operate it reliably. We like it because it allows the lightest installation weight which is so important to model ruggedness. What the future will bring in this all important item—the receiver—is not known. But, let us hope the free band will not impose too great a weight penalty as far as airborne radio weight is concerned.

There is more than one version of the RK61 receiver now available. Bill Nuckolls, of Santa Monica, Calif., makes a very good arrangement of it, and we are grateful to him not only for straightening us out on its proper use but also for helping with the supplementary instructions for it that appear later in this article. The total control installation weight on this airplane is 9 oz. This includes our basic minimum of rudder, elevator, two-speed engine, and cut-off. Battery life is generous; B batteries are the smallest hearing aid type and are kept above 50 volts with a charger. Four pen cells serve all low voltage requirements. The balsa block at the rear of the pen cell compartment is the result of a bad guess. When changing over from the medium flashlight cells which were required for ignition, we didn't know that pen cells could be so hot and thought we would need eight of them. The gadget behind the receiver is what we call a dive booster (for doing screaming dives) but since it is only experimental we won't report on it here.

What may look like the console of an organ on top of the fuselage is the switch panel. We like switches for everything for separate testing. These switches (which are shown more clearly in Fig. 4) can be homemade and they avoid use of the commercial slide type which are none too reliable anyway. Each switch is made with a short strip of .005 spring brass or bronze, and a convenient size dress snap. Hollow rivets are used to fasten each brass strip down to a 1/16" micarta or plywood panel. A knife slit is made in the plywood into which each brass strip is bent to prevent turning. A little skill is required to properly solder and align the dress snaps without impairing their operation. Male parts of the dress snaps are on the brass strips while female parts are soldered to hollow rivets or small wood screws in the panel. It's not hard—try it.

Fig. 5 shows the *Rudevator* installation. This is not so good. It would be better if the *Rudevator* were mounted on the left side of the vertical fin with a removable dirt protecting cover. Up and down elevator could then be easily adjusted by simply rotating the unit on its mounting bolt. The buried installation shown, with extension shaft, does not allow this.

What about the comparative advantages and disadvantages between this small ship and the larger 6 to 8' span models? In brief, the arguments might go something like this. The large model can be seen better at a distance and they fly smoother. True, but the small model can be flown in closer, because it requires less volume of space in which to maneuver. This is easier on the transmitter range requirements. The small model is capable of smooth flight but it does take a little more trial and error to trim it out. The large model, with its larger landing gear, will ride out a rougher landing terrain. Correct, but the small model is much less subject to damage if it noses over because it is more rugged. The large model flies faster and is better suited for bucking winds at a windy contest. Quite right, but it seems only logical to expect that if the popular concept of radio control leans toward the small model in the future as it has in other phases of model flying, the good old A, B, and C classification will be resorted to—and so it goes. In the end

(*Turn to page* 51)

Fig. 5 Rudevator compartment near tail

NATIONALS

(*Continued from page 12*)

really beautiful Scale Rubber jobs were in evidence; conditions Saturday morning, when this delayed event was completed, were really perfect and the scale ships did a fine job.

Radio Control flying showed a big improvement in number of entries, number of flights made, and quality of flying; in sharp contrast to other years, there were no serious crack-ups of any of the radio ships. About two-thirds of the 32 official entrants actually flew, and operations were conducted a bit differently than ever before in that contestants were allowed a total of one-half hour in the air rather than a certain number of official flights. This arrangement was agreed upon in advance by the contestants and worked well. The only drawback was that several of the boys had their ships caught in strong thermals, and even though they retained radio control, were unable to bring the planes down until long after the motors had cut, thereby using up valuable flying time. The moral is to trim your model so it can be spun, to lose altitude when necessary.

It was interesting to note that there were a total of 11 *Rudder Bugs* (see May and June issues of MODEL AIRPLANE NEWS), one of which, flown by designer Walt Good, won the Radio Event. This design has become so popular that modelers call it "the *Zipper* of radio control."

Second place winner, Paul Johnson, flew an original design, equipped with a sort of semi-proportional control, using a modified escapement. This control system (completely described in our July, 1949, issue), appeared to be simple and highly effective.

The Radio Event, of course, was to have been handled by June Pierce; following his sad passing, it was taken over by Mike Thomas, with able assistance from Russ Major, four highly competent Navy judges, and several Navy jeep drivers, who rendered all sorts of assistance.

Free flight, both Gas and Rubber, ran off about as usual, after a slow start. The first few days were pretty windy and hand launching was allowed. With the perfect weather that prevailed during Saturday and Sunday, the Class D Gas boys were required to R. O. G. The R. O. W. event, since it was held on Sunday, also benefited from the ideal flying conditions and many fine times were turned in.

The PAA-Load event opened with a novel stunt which chalks up another first for model aviation. P. A. A. had made up a number of small air mail envelopes, suitably emblazoned with the 18th Nationals, and a regular air mail stamp. A bundle of these were flown from the Radio Control site, across the field to the PAA-Load area, in the radio ship of Gene Foxworthy. The packet was then transferred to the cabin of a PAA-Load ship, owned by Denny Davis, and again sent aloft. As this plane came down from a flight of four minutes, the packet was transferred to a U. S. Mail truck and rushed to the Olathe Post Office. These first flight covers were mailed to many parts of the country and will doubtless become collector's items.

The Navy had several surprises in store for the contestants and spectators this year. One of these was the arrival on Friday morning of the Lockheed *Constitution*, world's largest landplane.

OFFICIAL 1949 NATIONALS WINNERS

NATIONAL CHAMPION
Ray Acord, Los Angeles, California

SENIOR NATIONAL CHAMPION
Einar Evevoldson, San Francisco, California

JUNIOR NATIONAL CHAMPION
John Humphreys, Lakewood, Ohio

CLUB CHAMPIONS
The Flightmasters, Inglewood, California

NOVICE AWARD
John Humphreys, Lakewood, Ohio

INDOOR STICK
Open—1. Don Donahue 1347.8; 2. Michael Demos 1303.0; 3. Robert Bienenstein 1302.0. *Senior—1.* Erwin Rodemsky 892.8; 2. Charles Sotich 746.4; 3. Einar Enevoldson 737.5. *Junior 1.* Paul Simon 906.4; 2. Ronald Plotske 649.8; 3. John Humphreys 465.0.

INDOOR CABIN
Open—1. George De La Mater 1156.6; 2. Manuel Andrade 1105.4; 3. Joe Bilgri 1062.5. *Senior—1.* George Xenakis 885.0; 2. Carl Redlin 835.0; 3. Erwin Rodemsky 618.0. *Junior—1.* John Humphreys 325.4; 2. Paul Simon 270.0; 3. Lyman Slack 120.2.

INDOOR H-L GLIDER
Open—1. Manuel Andrade 61.2; 2. F. J. Lilly 60.4; 3. Michael Demos 58.8. *Senior—1.* Donald Hollfelder 59.2; 2. Don Jagger 55.4; 3. Charles Hallum 54.6. *Junior—1.* Jack Butler 51.5; 2. Arthur Jens 42.0; 3. Paul Simon 37.8.

FREE FLIGHT RUBBER STICK
Open—1. Robert Bienenstein 595.6; 2. Dick Everett 536.1; 3. Dick Korda 486.0. *Senior—1.* Carl Redlin 420.3; 2. Don Jagger 400.6; 3. George Xenakis 397.6. *Junior—1.* Ronald Plotske 341.0; 2. John Humphreys 240.5; 3. Sherrill Bredfeldt 183.2.

FREE FLIGHT GAS CLASS A
Open—1. Fred Miller 726.5; 2. Dick Everett 579.8; 3. Merle Shammo 532.2. *Senior—1.* William Burgess 532.8; 2. Robert Darrah 530.0; 3. Don Hermestroff 422.0. *Junior—1.* Joe Stadelman 675.6; 2. Jack Butler 530.0; 3. Lyman Slack 395.6.

FREE FLIGHT GAS CLASS B
Open—1. Ray Acord 627.0; 2. Harold Tremps 595.8; 3. Joe Culver 570.5. *Senior—1.* Einar Enevoldson 705.8; 2. Eugene Bonenberger 632.4; 3. James Brakefield 600.0. *Junior—1.* Sonny Murphy 727.9; 2. Roger Barron 527.0; 3. Jimmy Jorski 488.7.

FREE FLIGHT GAS CLASS C
Open—1. Louis Torna 928.8; 2. Dennis Davis 722.8; 3. Paul Van Sant 680.1. *Senior—1.* Norman Mayeda 552.8; 2. William Burgess 539.0; 3. Bill Clark 535.2. *Junior—1.* Jimmy Jorski 562.2; 2. Richard Tremps 452.0; 3. Jack Butler 445.7.

FREE FLIGHT GAS CLASS D
Open—1. E. L. Enticknap 1800.0; 2. Harold Tremps 1378.6; 3. Sal Taibi 1295.0. *Senior—1.* Mervyn Schell 923.6; 2. Kenneth Dougan 904.2; 3. Ivan Wimp 824.0. *Junior—1.* Roger Barron 1118.0; 2. Jack Butler 810.1; 3. Dan Dougherty 608.0.

U-CONTROL SPEED CLASS A
Open—1. Harold De Bolt 116.88; 2. Dr. Warrden 112.50; 3. Erwin Huth and Charles Mathews 110.43. *Senior—1.* Mark Brown 113.92; 2. Robert Rawe 112.15; 3. Jack Breen 109.76. *Junior—1.* Warren Towne 105.88; 2. Everett Gray 103.75; 3. Bob Carnes 101.12.

U-CONTROL SPEED CLASS B
Open—1. Lew Mahieu 132.84; 2. V. Hudson 132.11; 3. Charles Schuette 131.39. *Senior—1.* Raymond Shearer 130.43; 2. Bill Mitchener 129.96; 3. Richard Rigney 127.66. *Junior—1.* Warren Towne 124.14; 2. Everett Gray 109.26; 3. David Coates 100.98.

U-CONTROL SPEED CLASS C
Open—1. Erwin Huth and Charles Mathews 137.40; 2. Frank Manley 134.58; 3. Dr. Warrden 133.33. *Senior—1.* Raymond Shearer 135.85; 2. Jack Friedland 134.33; 3. Richard Rigney 133.33. *Junior—1.* Phillips Laney 125.00; 2. John Rice 121.62; 3. Everett Gray 115.20.

U-CONTROL SPEED CLASS D
Open—1. Harold De Bolt 147.54; 2. Lew Mahieu 146.34; 3. James Jennings 138.46. *Senior—1.* Bill Wisniewski 140.63; 2. Raymond Shearer 139.53; 3. Eugene Stiles 136.36. *Junior—1.* McGahan 129.50; 2. Lyman Slack 122.40; 3. Bob Carnes 121.62.

FREE FLIGHT RUBBER CABIN
Open—1. Robert Dunham 623.6; 2. Robert Bienenstein 622.3; 3. Henry Cole, Jr. 617.1. *Senior—1.* Angelo Lo Castro 873.2; 2. Carl Baas 629.6; 3. George Xenakis 613.4. *Junior—1.* Ronald Plotske 263.8; 2. Jack Butler 201.5; 3. John Humphreys 182.3.

FLYING SCALE RUBBER
1. Delbert Swartz 77.9; 2. Bill Tharp 70.5; 3. Charles Hollinger 63.8.

U-CONTROL NOVELTY
1. Lou Andrews 188.3; 2. Howard Thombs 155.0; 3. James Snyder 144.0.

TOWLINE GLIDER
Open—1. Manuel Andrade 766.1; 2. Michael Demos 725.2; 3. W. Roberts, Jr. 682.0. *Senior—1.* Richard Fox 837.0; 2. Don Jaggers 717.1; 3. Dave Bell 645.4. *Junior—1.* Marvin Allen 530.7; 2. Clifford Teleford 515.0; 3. Don Shriver 262.0.

CO2
Open—1. Howard Robinson 613.2; 2. Bob Wright 588.3; 3. Dick Korda 583.9. *Senior—1.* Charles Sotich 735.5; 2. Richard Culp 682.2; 3. William Ehrlich 588.4. *Junior—1.* Dick Culver 431.8; 2. John Humphreys 404.0; 3. Larry Erickson 305.2.

U-CONTROL STUNT
Open—1. Bob Dailey 369; 2. Lou Andrews 354; 3. Capt. H. Bourgeois 352. *Senior—1.* Don Still 377; 2. Gene Marshall 369; 3. Russell Snyder 346. *Junior—1.* James Freshman 328; 2. Dave Webb 323; 3. Curtis Comer 310.

RADIO CONTROL EVENT
1. Walter Good 119.0; 2. Paul Johnson 109.2; 3. Jim Walker 94.2.

R. O. W.
1. E. L. Enticknap 1293.5; 2. Paul Gilliam 1061.0; 3. Dick Everett 838.9.

JET
1. Bob Cart 145.16; 2. Merle Koebernick 142.86; 3. George Sweet 140.08.

OUTDOOR H-L GLIDER
Open—1. Ray Acord 885.0; 2. David Kneeland 805.6; 3. Robert Dunham 742.7. *Senior—1.* Bob Costigan 736.6; 2. A. De Vaux 735.3; 3. Donald Hollfelder 559.4. *Junior—1.* John Humphreys 723.8; 2. J. Foster 382.0; 3. Luther Hayes 366.9.

U-CONTROL SCALE
Open—1. John and Biddy Matthews 359; 2. Fred Sage, Jr. 358; 3. Charles Hollinger 343. *Senior—1.* Dale Kirn 369; 2. Cpl. Bryant Thompson 317½; 3. James Smith 310. *Junior—1.* Ben Coffin 217½; 2. James Freshman 203½; 3. Sherrill Bredfeldt 163.

PAA-LOAD CLASS A
Open—1. Ray Matthews 797.0; 2. Paul Gilliam 428.0; 3. Fred Miller 420.0. *Junior and Senior—1.* Leo Caton 196.6; 2. Fred Whiting 99.3; 3. Gordon Hilton 70.4.

PAA-LOAD CLASS B
Open—1. Carl Rambo 2141.0; 2. Dennis Davis 2003.0; 3. Hubert Entrop 1863.0. *Junior and Senior—1.* Fred Whiting 1695.0; 2. Roland Lynch 1312.0; 3. Norval Hale 144.0.

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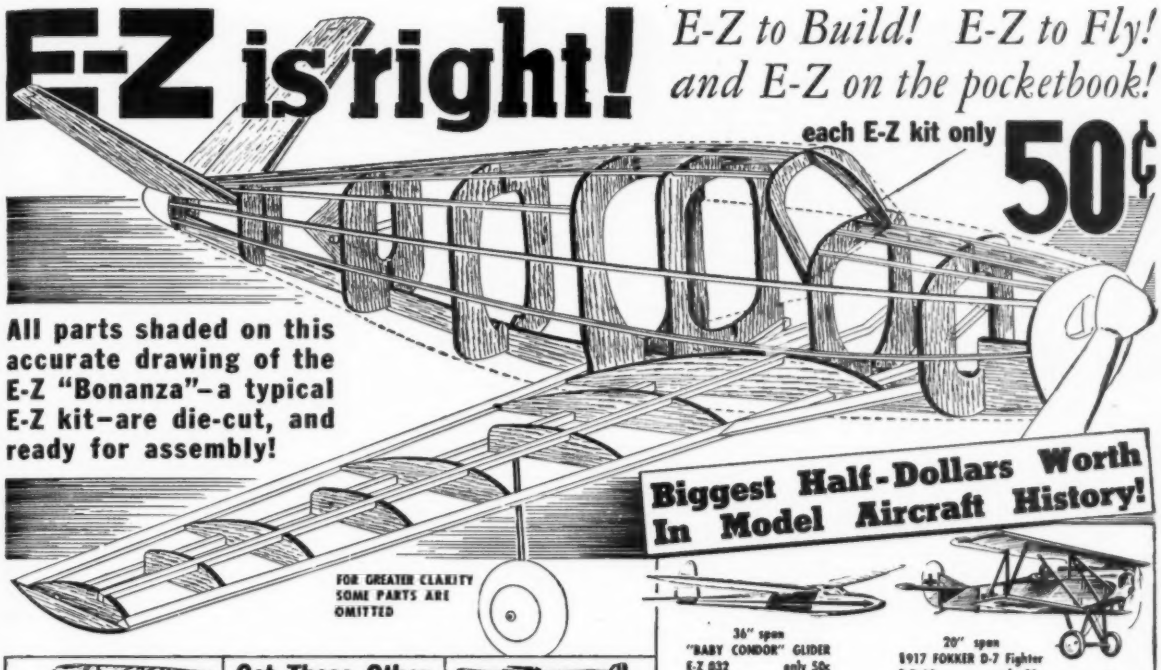

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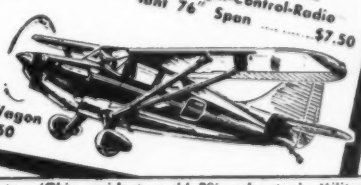

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Report from the West

(*Continued from page 8*)

C and Class D days. Most of us expected Dick Rigney to take Class D Senior Speed but he also had bad luck due to wind and cracked up his beautiful *McCoy .60* ship with which he currently holds the record at 155.17 mph. Dick did place third in B Senior at 127.66 and third in C at 133.33 mph. Another California boy claimed the Class D Senior Speed title with a speed of 140.63 —Bill Wisnieski of Hawthorne.

The Northern California boys turned out in numbers for the speed events, and really carried home the awards. Erwin Huth and Charles Matthews showed up with their beautiful set of speed jobs, which have aluminum fuselages with balsa wings and tails. They won first in C at 137.40, third in A at 110.43, fourth in D at 138.46 and sixth in B at 121.21. Jack Friedland, a sharp senior from Oakland won second in C Senior with 134.33 mph. Mark Brown from Stockton won Senior A Speed at 113.92 which was a new record.

* *

The following are the results of the *Los Angeles Aero Modelers* Annual Free Flight Gas Contest, held June 26: *Class A*—Lew Mahieu 12:59.8; Bill Tharp 12:18.0; and Bob Dagand 11:42.4. *Class B*—Al Trainor 14:46.8; A. Broeg 12:57.0; and Bill Creany 12:24.4. *Class C*—Dean Johnson 15:01.2; Loran Salisbury 13:24.0; and Jack Butler 11:48.6. *Class D*—Ray Acord 13:36.6; V. Flanders 12:04.8; and Don Petersen 11:39.3.

The weather on June 26, was overcast and only a few thermals were around. The Contest was handled well by the *Thermal Thumbers*, with Frank Cummings in charge.

Well, we are going to cut it short and say so-long. We'll have some news and happenings from the Plymouth Third International in the November issue.

Jupiter

(*Continued from page 19*)

Nevertheless, this is only an "opportunity" for drag reduction and it assuredly does not follow that simply replacing a conventional tail with a Vee tail automatically is an improvement—otherwise all aircraft would have them. The Vee tail may actually require greater area than the conventional tail depending upon the individual airplane on which it is installed. For example, the Vee tail layout places the tail higher in the slipstream than the conventional tail; and if this is too high, it may be out of the most effective area of downwash from the main wing, thereby making it necessary to provide additional area in order to obtain the same longitudinal stability. One way of overcoming this is the use of a higher aspect ratio on the Vee tail, which will make it more effective.

Among the advantages of the Vee tail is the reduced tendency towards "rudder lock," which occurs in a conventional tail when the rudder is placed at large deflection, stalling the vertical tail surface and rendering any further rudder action useless. The Vee tail reduces this tendency because one of the surfaces is *up* while the other is *down*.

Like all aerodynamic "tricks," however, this one has its disadvantages, chief of which is the possibility of interaction between the two functions of the surfaces. In a spin the standard method of recovery is to set the rudder full against the spin and the stick all the way forward. With the Vee tail it is, of course, impossible to obtain full control deflection on both controls at the same time. You can either have full rudder or full elevator, but only about half-and-half at the same time. Another difficulty shows up when trim tabs are used. If the rudder trim tab is set to hold the plane straight and the elevator trim tabs are set to hold the plane level, when the controls are moved, this whole balance is upset. As a result, the Vee tail airplane has to be very accurately balanced before take-off to avoid this situation.

Actually, there is little, if any, weight reduction by going to two tails instead of three. The added control system complication adds weight and the Vee tail surfaces must be made heavier in order to handle additional loads besides those of stability and control. Therefore, the manufacturer comes out about even on the switch insofar as weight and cost are concerned; but those who have flown the Bonanza like it—so obviously there is no pilot criticism of the arrangement, other than a slight roughness in gusty air due to the high angle of the surfaces.

It is amazing to see a list of what the manufacturer intends to give the purchaser of the *Jupiter* for his $2500. Jamieson says that for that amount you will get your choice of four color combinations made up of dark blue, dark green, tan with maroon trim, and maroon with tan trim. In equipment, you will get a starter, generator, battery, navigation lights, landing lights, cabin heater, complete soundproofing, full upholstery, airspeed indicator, altimeter, tachometer, compass, fuel quantity gage, fuel pressure gage, oil pressure gage, and a cylinder head temperature gage!

The *Jupiter* is powered by a Lycoming 0-235-C1 four-cylinder horizontally-opposed air-cooled engine, developing 108 hp at 2600 rpm at sea level. Jamieson plans to turn this engine up a little faster, probably to 2800 rpm, and get 115 hp for take-off. A fixed-pitch wooden propeller is used, fitted with a neat nose spinner.

Our Plane of the Month has a span of 29′ and is 20′ 10″ long. It stands 6′ 9″ high and has a main gear tread of 6′ 2½″. It weighs only 1600 lb., fully loaded! Jamieson claims that with three adults aboard, the *Jupiter* will cruise at better than 150 mph. This is truly good performance on a 108 hp engine and with three people aboard. In addition, he estimates that the *Jupiter* will climb at 1050′ per minute and land at less than 40 mph. The range will be 700 miles.

As this is being written, the *Jupiter* is nearing the end of its CAA Type Certification tests and may have received its certificate by the time you read this.

Jamieson Aircraft Company has been in production on an initial run of ten airplanes for the past few months and these are expected to be complete at about the same time as award of the CAA Approved Type Certificate, thereby permitting sales to begin. Several months ago Jamieson arranged dealerships with a number of fixed-base operators around the country, and at that time he guaranteed to offer the plane for sale at $2500, so he is not fooling when he says he is not fooling about that price!

From the available information on the new Jamieson *Jupiter*, it would seem that the prospective customer stands to receive one whale of a lot of airplane for $2500, and it can only be hoped that the company can hold that figure. For if they do, then we have a new, successful and growing personal aircraft manufacturer to take the place of those that either already have gone, or now are going, broke. This is the type of flying bargain the industry needs as a "shot in the arm," and we can think of no more complete and efficient airplane to warrant that fame.

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from Nationals

Again, "O.K." CO-2 sweeps the field placing first, second, third, fourth, fifth in all CO-2 classes including Junior, Senior and Open Classes. But — although no classification for its category has as yet been set up—the talk of the Nationals was the "O.K." Cub.

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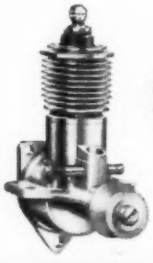

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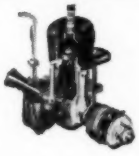

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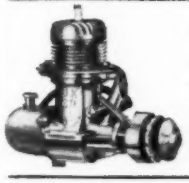

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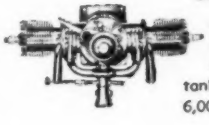

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Battery Box, Lg., Med. or Sm.	0.40	Flotorque Props, 8"-14"	35c
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Walker Remoto	12.50		
Flightline Reel	1.25		
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Plywood Sheets, 3/32, 1/8, 3/16, 1/4, 12"	1/16, 6"x 35c or 10c	T-56 Brown Contest Rubber, 1/8x1/30 flat 1c ft., 3/16 x 1/30 flat 1½c ft., ¼ x 1/30 flat, 2c ft., 1 lb. spool $4.50.	
Ball Bearing, Sm. Lg.			
Alum. Tubing: 1/8" O. D., 1/16 O. D., 3/32 O. D., Ft.	15c	Elc'mite Coil, 2/3 oz. 1.95	

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3/32 sq.	1c	3/32x1/8	2c	3/32x3/16	2c
3/32x1/4	2½c	3/32x3/8	3c	3/32x1/2	3½c
1/8 sq. 3 for	5c	1/8x1/4	2½c	1/8x3/8	3c
1/8x1/2	4c	5/32 sq.	1¼c	3/16 sq.	2c
3/16x1/4	3c	3/16x3/8	3½c	3/16x1/2	5c
3/16x3/16	4c	3/16x1/4	4c	3/16x3/8	6c
1/4 sq.	3½c	1/4x3/8	4c	1/4x1/2	6c
1/4x5/8	7c	1/4x3/4	8c	5/16 sq.	5c
3/8 sq.	6c	3/8x1/2	8c	1/2 sq.	9c
3/4 sq.	15c				

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1/16x2	8c	3/32x2	10c	1/8x2	10c
5/32x2	12c	3/16x2	14c	1/4x2	16c
5/16x2	18c	3/8x2	20c	1/2x2	22c
1/32x3	13c	1/16x3	13c	3/32x3	16c
1/8x3	16c	3/16x3	22c	1/4x3	25c
3/8x3	31c	1/2x3	34c		

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Beveled balsa trailing edges, 36" lengths

3/32x3/8	3c	5/32x5/8	5c	7/32x3/8	7c
1/8x1/2	4c	3/16x3/4	6c	1/4x1	8c

Propeller Blocks

8x7/8x1-3/16	6c	1-3/4	24c	18x1-3/4x2	32c
10x1x1-1/2	10c	Glider Wing Section		9x1-1/2x2	15c
12x1x1-1/8	12c			10x2x2-1/4	25c
14x1-3/16x		16x1-1/2x2	26c	3x3/16x20	18c

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Although we have a *Flash* on the Wakefield Meet in this issue, the full illustrated story, by Bob Hanford, who was a member of the U. S. A. Team, will appear in the November issue. Feature story in November will be coverage of the Plymouth Third International, with pictures and winners. Watch for these two write-ups!

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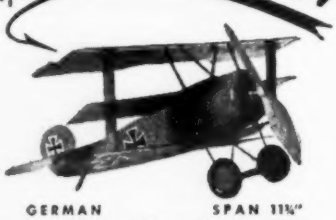

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World War I

(*Continued from page* 23)

for ease of manufacture, and all-important, maintenance at the Front, the 2 A.2 had equal span wings, no fixed horizontal or vertical stabilizer, yet the elevator and rudder were aerodynamically balanced to provide ease of control.

While the 2 A.2 was larger and heavier than the planes it was to replace, it was still smaller than many types designed later around about the same power and for the same purpose. Its over-all length was 27' 8" and span, only 38' 7". Chord of both wings was 5' 6", except at the tip of the upper wing, where the aileron's trailing edge swept back slightly. Gap throughout measured 5' 7" and landing gear tread was 6' 3", centered on the tires.

Weights and Performances

The Salmson weighed in empty at 1676 lb., and loaded, tipped the scales at 2800 lb. The total load carried consisted of 442 lb. of fuel and oil, a crew weight of 352 lb., 198 lb. of armament and ammunition, and 132 lb. of miscellaneous equipment.

The armament weight included a synchronized Vickers for the pilot and a brace of twin Lewis guns for the observer.

Maximum power permitted with the 9Z engine was a sea level restriction of 270 hp at 1350 rpm. The 2 A.2 was officially credited with a speed of 116 mph at 6500' altitude with the engine full throttle at 1300 rpm.

The 2 A.2 lost approximately one mile an hour speed for each thousand feet altitude, and at 16,400', the speed dropped to 104 mph. This speed permitted the 2 A.2 to keep up with the best German pursuits of 1917 and even toward the end of the war, improved German models seldom had more than a 10 mph edge on it at any altitude.

The Salmson did a pretty good job of climbing with full load, too. It reached 6500' altitude in 7 min. 15 sec., and the 16,400-foot mark in 27 min. 30 sec. The pursuits could better this last figure by about 7 to 10 min. except for a few unusually fast climbers.

Service ceiling for the 2 A.2 is listed as 20,300', where climb was only 100 f/p/m. Absolute ceiling of course depended on condition of the particular ship and the skill of its pilot, but Salmsons are reported to have reached 23,000' under ideal conditions.

Although one can never get a 100% pilot agreement on the plane's virtues, a vast majority of pilots who flew Salmsons during their W. W. I careers agree that it was a first-class airplane with few faults and lots of "flyability."

Because of its general proportions and weight distribution, it was excellently maneuverable at all altitudes, allowing, of course, for the usual sluggishness at higher altitudes. It could be looped, rolled, spun power on or off, Immelmanned easily and smoothly provided enough speed was available. The controls did not stiffen appreciably except at very high diving speeds (around 220 mph). It stalled off gently at low and medium altitudes, with increasing abruptness higher up. It was not a "hands off" ship for very long, but was light on the controls and easy to fly.

Take-off was relatively short, and the ship landed at about 45 mph tail high and at 40, three-point. What endeared it most to pilots was its long, flat glide—almost a "float"—which saved many a crew who lost an engine far out over the lines.

Structural details of the 2 A.2 will be presented next month.

The Firecracker

(*Continued from page* 31)

cracker, the intersection of the .049 displacement line and this compromise wing area line, gave approximately 140 square inches of area. (If considerable weight is to be expended on timers, it would be well to up this to, perhaps, 150 square inches.) With weight on the ball for the power loading rule now in force, the *Firecracker* then has a wing loading of about 5 oz. per square foot.

The tail moment arm is one-half span; the stabilizer area at 37% perhaps looks small, judging by many pylons. The NACA 4612 airfoil gave most satisfactory results having, for this particular ship, what must have been an optimum wing thickness. Wing thickness, and its L/D ratio, must be matched to an airplane for best results. While this is a rough rule-of-thumb procedure, a thicker wing belongs on a ship inclined to have high drag, and a thin wing on a sleek machine. To preserve airfoil accuracy, the wing is sheeted forward on both top and bottom surfaces, the sheet butting against the spars, with the spaces between the ribs then being filled with 1/32" sheet with the grain vertical. This gives an exceedingly strong wing and one that is close to being warp free. Complaints are heard about some stunt ships with top and bottom spars and sheeted leading edge sections, because they are said to be tricky to assemble accurately. However, the light spar webbing not only adds great strength but, if put in while the wing is on the bench, locks the construction against warps. No rigging angle is incorporated in the wing, the wing having only its normal incidence. When many of these airfoils are mounted "flat" they already have a number of degrees incidence. While the author has always had best results with the NACA 6409 when set at about 6° total incidence, the 4612 has performed well at low angles on both Wakefields and these two pylons.

The fuselage is built-up of four 1/16" sheet balsa sides, laid over diamond bulkheads. The stab, like the wing, is built-up, but is sheeted on the top surface only. It, too, is virtually warp free. Circular tips were employed on wing and tail to ease the enlargement of the half-scale plans. No one has ever conclusively proved that one wing-tip shape is better than another on gas models, and it is probable that round tips are as good as any. The fin is sheet balsa. Since the model is not overweight, why not use sheet where possible? It is stronger and better in every way for such usages on small airplanes, particularly where paper and hot fuel become a problem.

Performance depends to an important degree upon the propeller. Unfortunately, no one has propounded facts on prop selection. Far too often, the manufacturer's power curve for an engine is considered the only important factor in fitting a prop. Quite frequently, a bigger prop at less rpm will give better results in free flight. Diameter and blade area are but two other factors that affect climb, particularly when one engine sees duty in both U-control (at high rpm with small prop) and in free flight (with slower turning, larger prop). It is questionable that blind adherence to rpm will produce the best performance. In other words, engine performance may suffer a little by choice of prop, yet a given airplane may outclimb a sister ship with a high speed prop.

Using *Glow Flite*, and various mixtures of *Glow Flite* and *Dyna Fuel*—the two we happened to have handy—the *Firecracker* was flown with a great many props. Besides noting the varying performance and flight characteristics, it was decided that prop pitch (holding to a given diameter) is a remarkably precise way of controlling the flight of a model, rather than playing with rudder and offset. During most of our test flying, no downthrust or offset was used. Frequent alterations in props, hence in torque, prevented this. By progressive increases or decreases in pitch, power turns were adequately controlled.

Of the propellers available at the nearest hobby shop when this was written, only the *Ashland* 6-1/2" x 5-1/2" CO2 prop gave top results for this airplane. In fact, the best times were made with this stick. All manner of props were cut down, from 8" x 3" *Top Flites*, through *Rite Pitch* square-tipped 7" x 3" stunt props. Two basic props were developed; one was the Ashland, and the other a small one-blader, using a lead counterweight, a la the *Airco* Infant prop. This latter prop yielded very high rpm and can be considered (in proportion) to be equal to the racing engine big ship combinations. After numerous flights it was confirmed that the slower two-blade prop was yielding better times, although, rated from spectacular flight speed and noise, it appeared as if the one-blade affair had won hands down.

Both props affected adjustments so much that it is evident that one should not say how any one model will fly, or how to adjust it, unless a specific prop-engine combination is considered. Best performance from the *Firecracker* came with left power turns. Like other pylons we are familiar with, the *Firecracker* has

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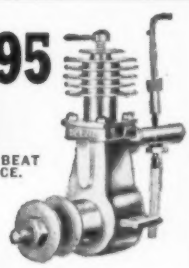

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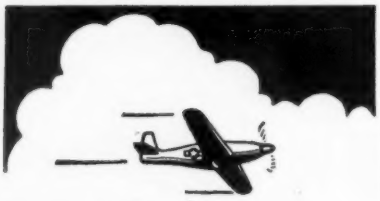

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a definite tendency to turn right under power. In fact, the power turn is adequately tight to the right when no rudder offset is used, the model gliding then in a straight line. A very wide glide turn can be used to the right by use of rudder, the power turn tightening up all the whole, but a very tight glide turn will be obtained only by the use of left thrust to prevent a wind-in to the right.

Some significant differences appeared between both our pylons at this point. The one with the lower wing mount—it had less pylon area by the way—could be glided very tight to the right with rudder alone and the power turn was more open, not tighter as on the *Firecracker*. It would seem that this points to the fact that pylon height, pylon side area, and ship profile has a direct effect on the turn characteristics of an airplane. That particular model could be flown satisfactorily to the right on rudder alone, but could be wound in to the left due to torque, if too much left rudder was used.

The *Firecracker*, on the other hand, like many pylons must be flown to the right only with caution and the judicious use of left thrust. But it performs beautifully to the left on rudder alone. Since its inherent tendency is to turn right, that tendency should be used, as you would use offset thrust, to be played against the glide turn.

After launching, the ship would climb at a slight angle in a straight line for a few seconds, then lean over to the left in a steep climb. After 20 seconds, it would have gone through from two to three complete power turns, ending in a good transition to glide without a trace of stall. Switching to the fast prop, the ship sped out straight in breathtaking fashion for a good 50', then whipped up its nose in a near vertical climb. Rather than loop, it went on up like a jet fighter, finally high in the air, gradually arcing off to the left to make about one-third power turn by the time the engine cut. A very light touch of right rudder, produced the same pattern to the right on the very next flight.

Here is a shining example of maximum angle of climb against best *rate* of climb. If the less spectacular climb was getting higher in 20 seconds, even though the model flew a greater distance, it was only because best climb is not necessarily the steepest.

Not only is a change in prop pitch an excellent way to control the power turn—a nice turn and transition is better than the few lost rpm's or the lost pitch, which are barely discernible—but switches in props have drastic affects on the ship. Experienced fliers know this, but if the ship is being flown to the right, and a lower pitch prop (with less torque) is installed, the machine may wind in to the right. Conversely, if flying to the left and the faster prop is installed, then the climb may straighten out, or even go over slightly to the right. Changes in props should be regarded similar to changes in rudder setting for the results are just as positive.

The engine is radially mounted with the nuts fixed firmly in place behind the firewall with several light coatings of cement. The nose section is covered with silkspan, folded over the firewall in front. The entire fuselage and other wood surfaces are given a coat of Testor's *Sanding Filler;* the forward sections of the fuse should have two such coats. Clear dope is brushed over the same surfaces and later the entire fuselage and wing mount are carefully fuelproofed. This type engine mounting has one disadvantage. If offset on downthrust is incorporated, hot fuel can seep behind the lug and back along the machine screws, through the firewall, thence to soften cement that holds the mounting nuts. If you intend to play with offset to get very tight glide turns without spin-ins under power, a more permanent attachment of the mounting bolts may be advisable.

We can offer no specific formula for adjustment. Fore and aft trim is fundamental, of course. In our case, the ship was hand launched from an elevation out over tall grass so that glide could be studied for 75' or so. As McCullough advised a couple of issues ago, flight testing was done at or near full power. All you need is one flight to be sure that power turn is not to the right, and a run of a few seconds reveals that.

Once the ship has been hand glided to the approximate correct trim, rudder probably can be used for all subsequent adjusting. For example, if the climb is satisfactory, but the glide a trifle stally, a tighter glide turn would be the normal correction. On the original, this could be done without the power turn laying the ship over too steeply on its side. In conjunction with this nose-light trim, it was observed that the ship always turned tightly, nose high, beginning to twist in the climb. If, instead of tightening the glide turn with rudder, the ship was made to glide faster by means of a shim under the trailing edge of the wing (the tail being permanent on the original), the climb would degenerate into more normal left, climbing turns, rather than a series of twists on the way up. Of course, if one insists on holding precisely the same climb while altering fore and aft trim, it would be necessary to incorporate downthrust in conjunction with nose-light trim and vice vera. However, with faster turning smaller props, or props with lower pitch, the climb turn becomes extremely open, with rudder alone deciding which way the ship will go.

In the designer's opinion, a model is underpowered and not properly fitted with a propeller if it "hangs" in the climb. Slow flight due to hanging brings about rolls, falling off, and other unwanted maneuvers. With plenty of pep and prop efficiency, the *Firecracker* should go upstairs like a jet job regardless of the steepness of the angle. If the small high speed prop is used, the climb resembles a fighter plane zoom from ground level. With hig velocity in the climb, it is advisable to avoid an absolutely straight climb. However, if a loop is forthcoming, it will be made so high that a two-minute flight will result nonetheless. It is felt that left power climb is by far the safest with this machine. Whether it is gyroscopic force or slipstream on the pylon and rudder, we don't know, but our only crash came to the right, and that was due to excessive movement of the rudder tab between flights.

Building directions. Just put it together. Seriously, there are but few points to look out for. One is the pylon, which descends into the fuselage between formers B and C, gluing onto the top of a 1/8" sheet tray (see front view). Another is the wing, which does not have spar joiners. Due to sheeting on both top and bottom, the webbing behind the spars, plus gussets at the edges, it is plenty strong. Especially note that two of the fuselage sides are narrower by 1/8" (1/16" on each side) to permit a perfectly square cross section to the fuselage.

Anyhow, the *Firecracker* is the kind of ship that quickly earns your affection.

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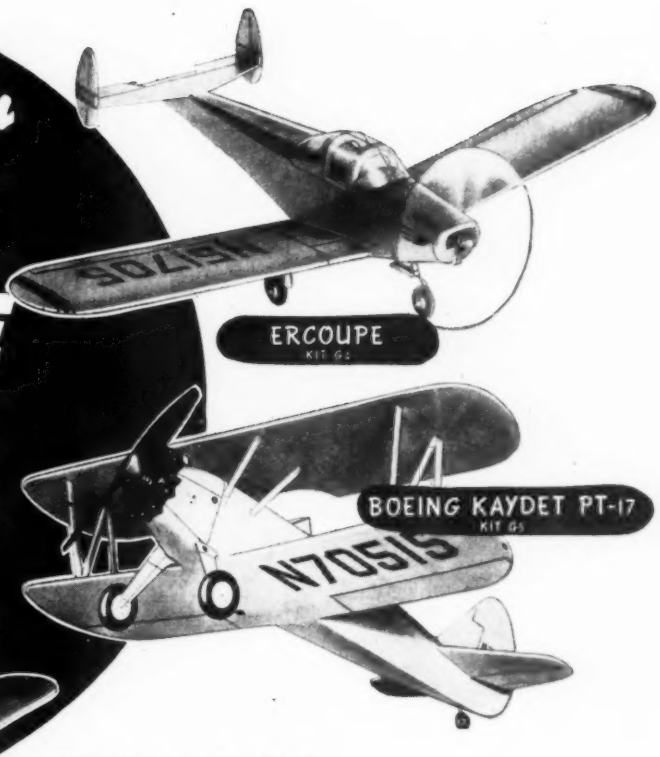

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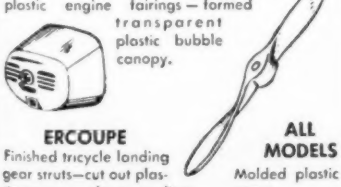

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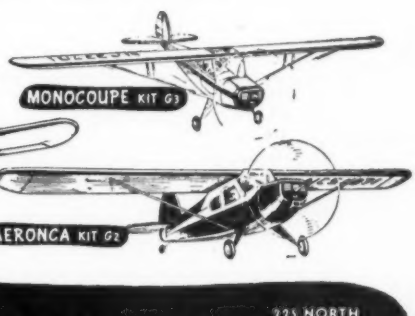

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Scrap Box

(*Continued from page 6*)

not take it easy when he should have, and was on deck as usual to handle the radio event. He was the father of the Mid-States group and was quoted on the beginner's problem in this column in a recent issue. The part of these meets you never hear about is the thankless job done by those who make the meet possible. Far into the night the day's results are being compiled, the problems dealt with, the following day's preparations being tied down. Jim and Mrs. McClelland, Bill and Mrs. Sparks, Russ Nichols and Val Luce facing a grind that only love of the hobby might require them to face. Many minor helpers and officials and judges, too. Roy Mayes and his Scale Committee sleepless for two days until the last ship was cleared. The Executive Council night after night facing the AMA's problems. More than one meeting terminated from sheer exhaustion. Year after year the same old-timers taking up the burdens. To a man they sincerely wish the younger blades would cease taking things for granted and assume some of the responsibility. After all, counting the war-lost years, the Nationals have been going on for a quarter of a century.

J. Don Walker, AMA Scientific 647, makes a few points on the question of safety in speed. Don recalls that old speed jobs with ignition frequently forced the flier to dig in and lean back as speeds approached 100 mph. But, as we learned about lighter ships and how to make them fly the circle, it became possible to fly at 100 mph or more with one hand. Don suggests that any model that requires hanging on and leaning back be grounded until necessary corrections are made.

"Many suggestions have been offered in regard to safety for spectators," says Don. "although pilots and mechanics take greater personal risks crowding the edge of the flight circles. The majority of spectators do not realize the possibilities of being hit, since the persons engaged take no heed of the risk they know they are running.

"Our *Cincinnati Controliners* have their own flying field," continues Don. "We have taken for our biggest problem the safety of the spectators. We have men in our club who pitched in and erected a fence. This fence encloses the area and gives a clearance of not less than 65' from any one of the circles. We used railroad ties for the uprights and enclosed the area with four strands of No. 9 wire. The majority of the materials was contributed by outsiders. The heavy equipment used to ready the field for flying came from the National Guard and Lunken Airport, all for the asking. This strong inexpensive fence controls the spectators in a very fine way." Apparently, the scheme Don describes is based on keeping the spectators out of mischief, rather than let them roam at will while a more elaborate fence would be needed to keep models from breaking loose. The idea is worth serious consideration. Anybody can build a fence.

"My friend, I've got the blues and here's what they sound like," glooms Harry Hurt, Jr., Big Spring, Texas. "I have got two *Madewell 49's* and I am really in need of parts for them—especially connecting rods. I have written a dozen or more hobby shops looking for rods, but no luck. I really need those con rods and would appreciate any help you can give me." Harry, you are breaking our heart. Can anybody help out this rodless Texan? His address is 1511 Runnels Street, Big Spring.

"Now that I have been introduced through the column, I would like to thank you for stating my views, even if your viewpoint did differ," announces Bill Clark, State College, Pa. "I received a number of letters, one from a fellow in Springfield, Ohio, who began, 'What in heck do you know about airplanes . . .' and another from the secretary of the *Cub Haven Model Club*, Lock Haven, Pa., inviting our club to compete, so I guess the "*Scrap Box*" gets around.

"My problem is to find out how I get on everybody's mailing list to hear about contests. Could contest organizers inform AMA who would then send out cards to registered modelers in the area? Once again I would like to plug my idea for a 'wild open class' event in free flight with no rules or restrictions other than that of a ten-second engine run. I think the designs that would be the outcome of an event of this type would be spectacular to say the least. So what if there would be freaks and tremendous crack-ups? I am sure that the builders would recognize the possibility of these things and be prepared to take the consequences.

"There are so many events to enter at a large contest, or one of the National type, that few, if any, can be prepared to enter each event. An event that would enable a man to enter and compete on a practically equal basis, even though he had only one engine, would soon become a popular one and a boon to the poorer builder. I am for it. What do you think?"

Bill, you'd be surprised. Don't let this go to your head, but you may be a little ahead of your time. A few months back the idea may have sounded a bit screwball. We would not be surprised to see free flight come down to one, or two classes. We expect it to. And, while we have not thought about motor run, the results of such a change could make a ten-second run desirable. If you guys think the "*Scrap Box*" has gone off its rocker, let's hear your reasons against the idea. Meanwhile, we'll hang onto the arguments for this so-called "wild cat class" and feel sure that we can give as well as we'll take. When guys can get four to six minutes on .045 and .049 engines you have to sit back and think. As to your getting on lists Bill, the most we can do is put down your address: 202 W. Prospect Avenue, State College, Pa.

From Elmer Haught, R.R. No. 2, Buhl, Idaho, this account of an endurance flight. "The *Majic Valley Gas Bugs*, of Twin Falls, have set what they believe to be an endurance record. The ship is an *Ercoupe* fitted with a pint-sized fuel tank and powered by a *Super Cyke*. It stayed aloft for 45 minutes. During this time the handle was passed around several times. The club would like to hear of anyone trying endurance flights because an endurance contest is planned."

Elmer, by the way, outdoes some really stiff story tellers this month with the following whopper. In fact, the bin holds some real yarns for the next few issues. Looks like we'll have to get out that Bible again!

"Dad was telling an old acquaintance about my P-51 controliner," begins Elmer. "He said that I was out flying my P-51 last Sunday and that it went into a power dive. I had a hard time pulling it out, and didn't quite make it. I had ended up with a badly mangled P-51 and felt awfully bad about it.

"Finally, the deeply interested listener spoke up, 'Gosh, he was lucky to get out of it alive!' "

The monthly award of a free subscription to MODEL AIRPLANE NEWS for the best tall but true story is yours, Elmer.

Water Bug

(*Continued from page 27*)

Remember to turn the model upside down when lighting the fuse, if you use a match, so the flame won't cause any damage.

(It must be admitted right here that because this precaution was forgotten once, and one model had to be ducked in order to save most of it, as the open flame and the doped surface of the wing did not get along well together.)

Set the model on the water and it will gather speed until it takes off and then it will really climb. Keep the weight of the model to a half ounce (less the jet unit) and you will have a real flier.

The model was originally made with a small tail float, but was found to take off better without it. At rest on the water, the rear tip of the boom just touches the water; usually the floats clear the water first, followed by the boom tip.

Model Prop Design

(*Continued from page 25*)

climbing air speed is 0.69 for this airplane. The dimensions for the new propeller would then become 9.80" diameter x 4.90" pitch, or—after rounding off—9-3/4" x 5". (The high speed of free flight jobs is not so easily estimated; probably the best procedure would be to hook it up as a goat and clock its speed before designing a contest prop.)

The characteristics of this model, equipped with racing and stunting propellers, are presented in Fig. 5. A flying weight of 26 oz. is assumed for these examples. Because of the popularity of wide-bladed props for stunting, a prop with blades of twice the usual width is included.

The best angles of climb are also computed, since this is even more important to a good stunt model than a fast rate of climb. These two factors should not be confused; the steepest climbing angle is attained at less than the maximum rate of climb, and at a somewhat lower airspeed.

The comparison is most enlightening. By shifting to a climbing propeller, the ship hustles upstairs nearly 10% faster at a speed sacrifice of only 2 mph. The boost in climbing angle is even more striking; the extra thrust of a good stunt prop permits the ship to stand on its tail and climb straight up at 2300 feet per minute.

The effect of increased blade width is significant also, though perhaps not in the way its supporters imagine. The high-speed loss is four times as great, with no corresponding advantages. Both rate and angle of climb are inferior to a racing prop, and the rate of climb is fully 30% less than with the standard stunt prop. The fact is that wider blades are inherently less efficient; by doubling the width, the thrust horsepower is cut down 18%, even with a well-designed propeller.

The reader's next thought may be, "Why not get still higher efficiencies by using extremely narrow blades?" A narrower propeller would probably have been selected by the test engineers if it were worth while, but there is little advantage in carrying this beyond a certain point. The improvement is only 6% more with propellers of half the normal width.

The blade form given here represents one of the best combinations of serviceability and efficiency for wooden propellers. The key to high performance lies not in bizarre propeller shapes, but in rational design procedure. Try this system on your next "hot rock," and give your engine a chance to deliver all the power the manufacturer built into it.

Cabin 160

(*Continued from page 21*)

lighter is used, light the fuse before inserting in the box.

FLYING. Use a small amount of right rudder to achieve a right glide turn. If the C.G. is located as shown on the plan, all adjustments may be made by altering wing incidence. A little left thrust may be used if the power turn is too sharp to the right.

This model has been flown with as much as 20 strands of 3/16" English black rubber, which is roughly equivalent to 18 strands of 1/4" T-56. Our *Cabin* 160 handled the terrific power burst with ease, so don't be afraid to pack in the winds when you have it fully adjusted. Also, don't forget to—light the fuse!

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Design Forum

(*Continued from page* 13)

half that of the rear wing. To determine the proper area at 3°, we must find what the lift is at 3° compared to 1°. Most cambered airfoils especially of the type used for models start to lift at approximately —3°. In other words, the effective lifting angle of any airfoil is the positive angle of attack plus the negative lifting angle. Therefore, the effective lifting angle of the front wing is three negative degrees plus three positive degrees; (3° + 3° = 6° of *effective* lift). The rear wing has 3° + 1° = 4° of effective lift, so equal areas of front and rear wing lift in the proportion of 6 to 4 or 3 to 2. In other words, at 3° the front wing lifts 50% more than it would if set at 1°. However, at 1° the front wing area should be one-half of the rear wing ($A = \frac{B}{2}$). Therefore at 3° instead of 1°, only two-thirds as much area of front wing is needed to give one-half the lift of the rear wing. 2/3 of 1/2 = 1/3, so the front wing area should be one-third of the rear wing. Make it a rule in pusher design to use these relative areas and angles. This will locate the center of gravity approximately as indicated in Fig. 1.

Larger front wings usually cause slower reactions. Smaller front wings cause faster reactions but often *over* reactions when the plane regains its equilibrium after being disturbed. With this proportion, reactions usually are smooth and result in less loss in altitude during recovery from displacements while in flight.

The next problem is lateral stability. Actually in a pusher, the front wing is the main wing and the rear wing is the tail plane in some respects. In thinking of the rear wing as the main lifting surface, designers are apt to provide it with too much dihedral. If each rear wing tip is raised 1/2" for every foot of its span, you will usually have sufficient dihedral. In gas models sometimes 50 to 75% more is required but not in rubber powered planes. On the other hand, the smaller front wing should have a dihedral of about 18 to 20° on each half wing. This means that each wing tip should be raised about 2-1/2" for every 12" of wingspan.

This large dihedral is essential and contributes greatly to the duration as well as the stability of the airplane from purely an efficiency standpoint. Theorists will say this is not so but actual practice shows otherwise. Whereas the aerodynamic efficiency of this front wing may be less than a straight wing, the extra stability and steadiness of flight provided by this combination of front and rear dihedrals results in much less loss of altitude and required power when it is disturbed or turned from its normal flight course. Some who have seen pushers in flight may have seen them stall and dive, and follow anything but a steady course. This is not only due to improper adjustment but to errors in design. Large dihedral at the front wing helps to correct this condition, preventing sudden stalling and diving. When such a pusher starts to climb too steeply, the air spills out of the large dihedraled front wing because of the slower speed during climb, so that lift automatically is reduced at the nose. This reduction causes the front wing to drop gradually, yet positively back into a normal line of flight and to reduce stalling tendencies. Normally, the difference in angle between the front and rear wings is supposed to provide this longitudinal stability. It does cause longitudinal correction but the large dihedral at the front makes this correction more gradual and effective.

Another trick in longitudinal, as well as in lateral, stability is to raise the front wing above the thrust line as indicated in Fig. 1. The proper distance of the front wing center cord above the thrust line should be equal to 1/2 to one times the chord; 60% is a reasonable figure. The effect of this high front wing is to raise the line of resistance L.R., Fig. 1, so with the propellers pushing forward along the thrust line and the resistance acting backward above it, a natural nosing-up or climbing moment is generated. Because of this, the angle of incidence of the front wing may be reduced. Usually the front wing angle provides this nosing-up tendency. When creating this tendency by the position of the wing instead of by its angle, we have the same effect without the necessity of using excessive angle. It is advantageous to use less incidence because the greatest aerodynamic efficiency results when both wings are set at the same angle. The difference in angle usually is required for stability, which is more important than aerodynamic efficiency. Without stability aerodynamic efficiency cannot be demonstrated. What we actually do here is to use the drag of the front wing to produce a beneficial effect. Usually the angle of incidence may be reduced to 2 or even 1-1/2° instead of 3°, with little if any change in the position of the center of gravity, marked C.G. in the figure.

Now we must tackle the problem which has caused such controversy; namely, designing for spiral stability. As most of you know, this is a combination of directional and lateral stability. When spiraling, a plane rotates about the vertical axis XX, Fig. 2, and simultaneously about the longitudinal axis LL. The instability is caused by this *simultaneous* action. If this simultaneous effect can be eliminated, there can be no spiral instability. In other words, if the plane rotates simply about LL without rotating about XX, it will bank steeply or even turn completely over through 360° and keep right on going on a straight flight course. If it turns simply about XX and not about LL, the model will circle in a horizontal plane. However, usually when a plane rotates about LL, the pull of its weight at the center of gravity will cause the nose to slide downward sideways when the plane banks. If this sideways motion continues without a counter-rotation or correcting rotation about LL, the spiral will continue until the plane crashes. This sideways sliding of the nose may be prevented by having the center of side area of the model coincident with the C.G.; then the whole airplane will slide sideways without any change in its direction or rotation about XX.

Hundreds of rubber powered canard pusher planes have been built this way to insure spiral stability. Under power they act beautifully but when gliding a slight directional displacement will start them into a tight spin, the front wing being the pivot, with the rear part of the airplane spinning around. In other words, they act very much like a maple seed spinning until it hits the ground. This, of course, reduces the time of glide to a small fraction of normal. The cure is to place the center of side area as in Fig. 3 to the rear of the C.G. This gives directional stability during gliding as well as power flight. However, when turning with the C.L.A. rearward of the C.G., the nose will slide sideways toward B, Fig. 2, because the pressure F., acting at C.L.A.,

tends to hold the rear while the pull of weight W at C.G. pulls the nose sideways and down, since the plane is banked. If correction is not made in either of the two rotations about LL or XX, the plane will crash. The raised and dihedraled front wing provides this correction. During the sideways movement of the nose, the air approaches the front wing from direction A1 causing greater lift on the lower side of the front wing and creating a counter rotation about LL to level flight. This is illustrated also by Fig. 4, which shows the pull of gravity W acting toward the low side of XX and the lift forces L_1 acting on the low side of the wings. The lift resultant is R_1. This and the forces W cause a clockwise correcting couple to right the plane in the direction indicated by arrow M_1.

Arrow F_1, you will note, is the pressure due to side-slipping on the vertical fin that extends beneath the fuselage. This fin is absolutely necessary for stable flight though it does not contribute directly to recovery in a side-slip. First, it gives directional stability, preventing a spinning about, the front plane during glide, and second it provides spiral stability during high speed skidding flight by keeping the center of lateral area low on a line with C.G., as in Fig. 3.

Fig. 5 illustrates the force reaction during fast skidding flight and shows the corrective influence of this fin. You will note that because of the speed while turning, a centrifical force C_2 is generated. This combined with the pull of gravity W_1 gives the resultant WC_2. Now, unlike the case of the side-slip, the resultant WC_2 acts to the right of the vertical axis XX and toward the outside of the turn. This outward pulling force causes the plane to slide outward and produces the side pressure on the fin. It also increases the lift on the right wing in Fig. 5, causing the lift L_2 to move to the right. This movement is small compared to the case of the side-slip because with the fin the plane banks *only slightly* if at all and thereby causes only a slight difference in lift between the right and left wing. The *angle of yaw* during skid is very small compared to the sideslip Fig. 4. This also reduces the movement of lift L_2 toward the right. So we have a force set-up where lift L_2 and fin pressure F_2 produces resultant R_2. The centrifugal force C_2 and weight W_1 produces resultant WC_2. These two forces form a clockwise couple during a right hand turn, left of drawing. This, as you can see, prevents, reduces, or corrects the counterclockwise banking or rotation. In effect, it holds the plane at a very small angle of bank during the turn and thereby the nose of the airplane has little or no tendency to slide inward and start the vicious spiral that results in crashes.

If you do not follow this reasoning, or do not agree with our conclusions, let practice be the judge. Design the plane as shown, putting a fin beneath the rear wing of such size and position that the center of lateral area comes rearward of and on a line with the C.G., as indicated in Fig. 3. Then, if all the factors of wing angle, area and general proportion are faithfully reproduced and your airplane spiral dives, you can disbelieve our reasoning in respect to the C.L.A. However, if you have not introduced some other troublesome factor, this low fin at the rear will create a steadiness of flight under all conditions that you have never experienced previously.

Canard pushers have presented a complicated design and structural problem to gas model fans because of the central position of the center of gravity. When heavy motors are placed at the rear where they are the most convenient, it is commonly necessary to weight the nose in order to bring the center of weight at the proper central position. This extra weight reduces flight duration. The most convenient and efficient solution to the problem is to place the motor at, or slightly forward of, the center of gravity in a central fuselage as in Fig. 3. This provides the proper balance but necessitates the use of an extension shaft rearward to the propeller at the rear end of the fuselage. Though this is an added complication, it is not extremely difficult to install this shaft. In fact, the added advantage of proper balance far outweighs added structural difficulties. If you can solve this problem and design your ship as shown in Fig. 3, you will have a canard pusher gas model that will give any tractor a run for its money. For hand launching the front landing wheel shown is not necessary. For ground take-offs, two wheels should be used: one right, one left. After take-off these can be so arranged that they will automatically fold backward and inward against, or into, recesses of the body.

This discussion has been inspired by many questions about canards, one particularly from Arthur Guttman, of Telaviv, Israel. He is now staying with Dr. Lichtenhahn, Prossura, Aroia, Switzerland. He has built and submitted a sketch of a pusher very similar to the one shown in Fig. 3, except that the center of gravity is approximately six times as far from the front wing as the rear. This necessi-

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Harold DeBolt, sensational speed flyer from Williamsville, N. Y., used a Power Prop to win first in "A" Speed open.

Ted Enticknap knocked off three cloud-busting ten minute flights in a row to win "D" Free Flight open with a Top Flite. Ted hails from Auburn, Wash.

Dick Culver, Oak Ridge, Tenn., son of the 1929 National Indoor Champ, Joe Culver, proved his own championship qualities by winning first in CO^2 Junior with a Power Prop.

In "C" Free Flight Jr. Jimmy Jorski of Oklahoma City won first with a Top Flite.

Fred Whiting, Oklahoma City, last year's second place winner, came through this year in first place in "B" Jr.-Sr. Payload using a Top Flite.

Top Flites came through again when Sonny Murphy of Anderson, Ind., won "B" Free Flight Jr.

In Precision Stunt Open, Bob Dailey of Ferndale, Mich., took first with a Top Flite.

The Precision Stunt Junior Championship was won by James Freshman of Berkeley, Calif., with a Top Flite.

Bill Burgess of Muncie, Ind., last year's "C" Free Flight Champ, repeated this year with a Top Flite in winning "A" Free Flight Senior.

And last year's National Junior all 'round champion, Charles Sotich of Chicago, Illinois, used a Power Prop to win this year's CO^2 Senior.

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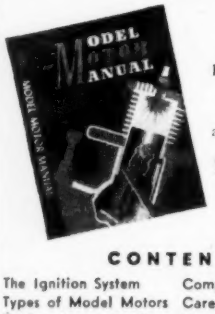

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tates a front wing which is very small. The whole combination, though practical, will not give as good results as the one shown here where the C.G. is further forward and the front wing larger. In fact, the model in Fig. 3 may be flown with either rubber or gas power without changing its proportions due to the central location of the gas engine as indicated. Mr. Guttman's plane is of excellent design except for this one feature. With the C.G. farther rearward, it is apt to be a little erratic and over responsive to nosing-up or diving influences.

Not only will these canard pushers give contest performance, but they at least provide a variety in design which has been looked for by progressive modelers for such a long time. Now if motor manufacturers are as progressive as model fans, they will make available prefabricated extension units that may be installed quickly and easily.

Of course, they can continue to supply merely the motor and let the fans worry about accessories. However, an extremely large percentage of fliers are not capable of or will not develop these necessary accessories themselves. Consequently, they are flying the same *old* airplanes. The only hope lies in the foresightedness and ingenuity of our scientific builders. Mr. Arthur Guttman is an excellent illustration of this situation. Materials have not been available to him in Israel but this did not stop him. He was ingenious enough to build his canard pusher out of hard wood, retrieved from old boxes and other discarded material. It goes to show that even in 1949 adversity breeds progress and does not stop those who have a will to accomplish something.

Don't forget, send your questions and ideas to *"Design Forum"* for discussion.

Air Ways

(*Continued from page* 26)

one of them can be placed on the team.

Regardless of this, the Regional Eliminations seems to be the best arrangement so far thought up and as such, it will probably be used again next year. We echo AMA President C. O. Wright, however, when he says, "It is evident that next year's plans for Wakefield must be developed and announced far in advance."

WE HAVE OFTEN complained of the quality of photos sent us for use in *"Air Ways,"* or even to illustrate articles. So many people have difficulty in turning out good photos, even with high-grade equipment, that we will publish, beginning with the next issue, a series of five monthly articles on *"Model Portraiture"* which will outline the fundamentals and techniques for the photographing of models and other still subjects.

Prepared by Ray Rusher, the articles will show how to make and use photographic equipment to produce photos such as have been run in recent articles by Mr. Rusher. Expensive cameras are not necessary, incidentally, as Ray uses a 30-year-old Autographic Pocket Kodak for this work.

These articles will also explain how all the necessary equipment can be made for less than $10 by the average modeler, so that he can produce good pictures for his personal use or for submission to magazines for publication. This equipment, illustrated herewith, will be found a valuable aid to secure professional results with an inexpensive camera. We know all aeromodelers will be interested so watch for these articles.

Our first photograph this month is a very unusual type of asymmetrical ship, dreamed up by L. W. Christensen (518 East 134th Street, Hawthorne, California). This model has a 3' span, is powered by an *Ohlsson 23* and weighs 2 lb. First test flights were made with a shorter span and the ship performed very well. After it had been flown, considerably more wing area was added and the dark blue and white paint job was applied. The airplane flew very nicely but came to a bad end when, to quote Mr. Christensen, "The engine quit on the upwind side of the circle, so I rolled up my lines and picked up my engine and went home."

The attractive free flight model in picture 2 is a design of Henry Lansford (1015 Second Avenue, Laurel, Mississippi), who is a member of the *Laurel Model Aero Club*. He gives no details of the model except the fact that it is powered by an *Arden .099* engine. After about a dozen flights had been made, the ship disappeared in some woods and has not been seen since.

The smiling gentleman in our third snapshot is Hal Roth (2305 West Sixth Street, Los Angeles 29, California), who is holding his model which was developed for competition in the recent Wakefield Eliminations. This ship has a wing area of 199 sq. in., a stabilizer area of 32% of wing area, rudder area is 15%, and the 18" prop has a 24" pitch and is fitted with a free wheeling mechanism. The plane is powered by 32 strands of 1/8" flat Dunlop rubber, made up to a length of 50". Tissue covering is used on wing and tail with silk on fuselage. Flying weight is 9-1/4 oz. Flight test proved very gratifying, and it was found that the English rubber worked out nicely. Although the model is 1 oz. overweight, the general construction was made rather heavy in order to add to the durability. A fuse type dethermalizer is used which causes the tail to pop up after six minutes time.

An unusual controliner appears in photo 4. This big biplane is the work of Richard Francis (5815 Woodland Avenue, Philadelphia 43, Pennsylvania) and has a 6' 1" span on the upper wing with a total wing area of 1300 sq. in. The airplane weighs 9 lb. with the 1 qt. fuel tank filled to capacity. The *Forster 99* engine is fitted with a two-speed timer. No wing struts were used in the plane and the controline guide is held out on a boom visible between the wings in our photo. The airplane is said to be a beautiful flier.

Adrian Bishop (Technical Staff Mess, Royal Aircraft Establishment, South Farnborough, Hants, England) sent in the fifth picture, which is of a Bell X-1 scale model, on behalf of a research group, known as Aero Enterprise. This group, which is now practically inoperative due to members moving away from the district, was formed mainly to undertake experimental work in model helicopters and jet propulsion units. The Bell model is powered by a small liquid fuel rocket and originally was intended for free flight. In view of the potential danger of a model traveling at such high speed, it was later modified for U-control. The fuel consumption of the rocket engine is extremely high, permitting flights of only 30 to 40 sec. Operating on reduced thrust, however, speeds of 100 mph were recorded. The model has an 18" span and the length is 20" over all.

Our last picture shows a scale Stearman N2S3 which was built by M. B. Tidmore (Tidmore's, Deming's Shopping Center, Deming, New Mexico) as an exact replica of the large plane he owned until it was destroyed in a hangar fire. The big plane

was named *The Flying Bedpan*, which name is also emblazoned on the model.

NEWS OF MODELERS

In this column we publish the names and addresses of readers (most of them from overseas) who write us that they are eager to contact American modelers. Some seek a pen-pal; others wish to exchange a foreign jet or diesel for an American engine; some would like to exchange magazines, plans, etc. You will find it very interesting to select one or two names and start a correspondence with these fellow modelers.

PEN-PAL SEEKERS: Francis Megahy, 73 Katherine Road, East Ham, London, E. 6, England . . . John G. Kent, Eight Logan Street, Geelong West, Victoria, Australia . . . Maurice Skikne, 61 Northdene Avenue, Brakpan, Transvaal, South Africa . . . R. W. Pascoe, 100 Ferguson Street, Palmerston North, New Zealand . . . A. E. Currie, 19 Cavendish Place, Jesmond, Newcastle-on-Tyne 2, Northumberland, England.

CLUB NEWS

California

Membership of the *Los Angeles Devilaires U-Control Model Airplane Club* is now 13. They are very fortunate to have as their sponsor the Crescent Model Shop. In addition to letting the *Devilaires* use their shop as a club room on Wednesday evenings at 8 p.m., the shop has supplied them with beautiful T-shirts. New officers of the club: Hal Selson, Sr., president; Darwin Adler, secretary-treasurer; and Mal Alberts, senior advisor.

The *San Francisco Mustang Club* held their 3rd Annual U-Control Contest under the title of the Mustang Air Fair, June 5, at the San Francisco's Polo Grounds. The contest was very well attended and over two hundred modelers competed for prizes. List of winners are as follows: *Speed Senior Class A*—E. Huth and C. Mathews 115.38; *B*—E. Huth and C. Mathews 122.03; *C*—E. Huth and C. Mathews 144.57; and *D*—Frank Hampton 134.73; *Speed Junior Class A*—Don Holm 100; *B*—Mark Brown 112.71; *C*—Mark Brown 123.03; and *D*—Mark Brown 132.06; *Jet* (no age classification)—Tom Gatewood 113.42. *Precision Senior Class A*—Herb Ross 347 pts.; *B*—Herb Ross 374; and *D*—David Marshall 343; *Precision Junior Class A*—Eugene Stiles 369; *B*—Eugene Stiles 351; *C*—John Hoskin 294; and *D*—Eugene Stiles 370; *Precision Women's Event*—Mrs. I. M. Favre 103; *Freshman Event* (under 14 years)—Dick Bastien 232; *Balloon Busting Precision Event* (no age classification)—Don Butman 256; *Exhibition Scale Event*—John Vlavianos 300; and *Flying Scale Event*—Roy Mayes 376.

Maine

Another new club is the *Gardiner Flying Tigers*. The recently elected officers are George Brann, president; Dennis DeCosta, vice president; Ronald Brann, secretary; and James Christensen, treasurer. Mr. Brann promises to report on club activities from time to time.

Massachusetts

John Fitzgerald, representing his club the *Beverly Sky Jockeys*, writes that they welcome all new members in the vicinity of Beverly. This is a recently organized club and they boast a membership of 40. Meetings are held weekly on Wednesday evening at the Community Hobby Center, the local model shop. Donald Hiller is president, William Morgan, Jr., is the club's secretary, and the treasurer is Antonio Bectone. Main activity is con-

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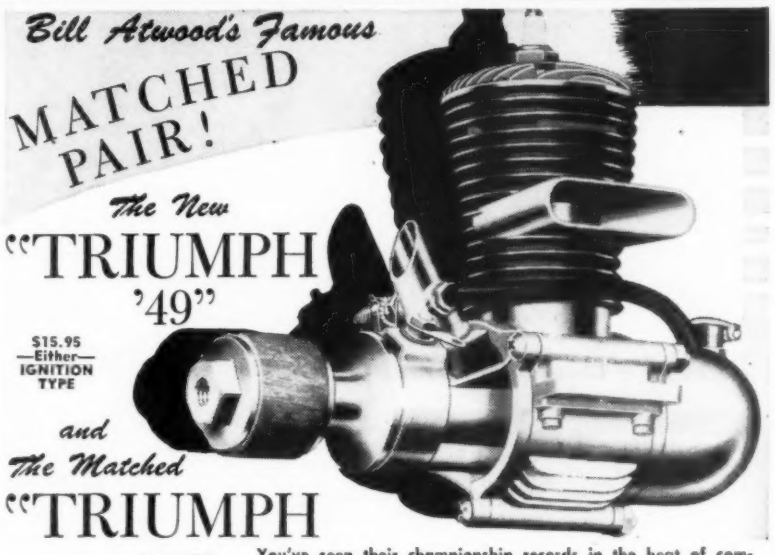

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Lockheed F-94

Way back in 1945 we featured the first successful U. S. jet plane, the Lockheed P-80. The design has undergone continuous development since the first model. The latest design is a two-seated night fighter designated F-94. This will be our "*Plane of the Month*" for November, and the coverage will, as usual, include pictures, story and three views.

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centrated on stunt and flying scale. Present interest now—accumulating sufficient funds to obtain an AMA club charter.

The *Andover Air-istocrats* are also looking for members. Write Bob Bachmann, Strathmore Road, Andover, if interested. The club favors controline and free flight.

Missouri

A five-year-old boy upset a model airplane meet at the Grandview Airport, July 16-17, by becoming one of three contestants from five states to qualify for the International Meet at Detroit! Fred Sage, III, of Independence, flew his planes to firsts in stunt flying and in the speed event, Class B, Jr. division.

Ohio

The *Rubber City Aeronuts* sent the results of their first small contest, held June 19, at Chamberlain Field, a little late. The *Aeronuts* took motion pictures of the contest and plan to take them of every contest sponsored in the future. Forty contestants participated. Following are the first place winners: *AJ Glider*—George Pittinger 14 sec.; *H-L Open*—Dick Obarski 1:56.6; *H-L Jr.*—Phillip Narzisi 1:1.3; *T-L Open*—Dick Fox 2:03; *T-L Jr.*—Marvin Allen 1:39; *Class A Sr.*—Gene Kemmerline 91 mph; and *Endurance U-Control*—Dick Bender 28:6.5.

Here are the results of the 3rd Annual Cincinnati Model Plane Contest, held at Lunken Airport and Lunken Playfield, which was sponsored by the TIMES-STAR and the Plymouth Dealers of Greater Cincinnati, in conjunction with the Public Recreation Commission.

FREE FLIGHT EVENTS. *H-L Gliders* (all ages)—Frank Heeb 1:00.2; *T-L Gliders* (all ages)—James Gaz 1:49.3; CO2 (all ages)—Warner Stewart 3:10.1; *Outdoor Stick Rubber Open*—Frank Heeb 7:27; *Jr. & Sr.*—James Curry 8:47.1; *Outdoor Cabin Rubber Open*—Claude Curry 18:56.3; *Jr. & Sr.*—Carl Loekle 15:44.6; *Gas Models Class A Open*—Charles Greathan 3:14.5; *Jr. & Sr.*—Wayne Pricket 2:03.7; *Class C Open*—John Lawarrie 3:25.2; *Class D Open*—Charles Greathan 28:30.6. CONTROLINE EVENTS. *Speed Gas Class A Open*—Thomas Anderson; *Jr. & Sr.*—Donald Ewers; *Class B Open*—William J. Roller; *Jr. & Sr.*—Donald Ewers; *Class C Open*—Harold L. Springer; *Jr. & Sr.*—Donald Holmes; *Class D Sr. & Jr.*—Lloyd Doyle; *Speed Jet Open*—Pfc. Robert L. Morse; *Stunt Gas Open*—L. H. Higelmire; *Sr.*—Pfc. Richard C. Fall; and *Jr.*—James Green.

The Cleveland Women's chapter of NAA spent the July Fourth holiday week end registering and classifying entries in the annual Junior National Air Races Model Meet held at various Cleveland model ports. The chapter's trophy was won by the high-point novice of the Meet, 13-year-old Sylvia Lanzo, of Berea, Ohio, who also came out as the high-point girl entrant, for which she won the Arlene Davis trophy. Members of the CWNAA who served at the meet included: Mrs. Harry D. McCall, Mrs. Lyman A. Slack, Mrs. Harold E. Mincks, Mrs. A. H. Van Duyn, Miss Julia Roman, Miss Helen Patrick, Miss Annabelle Loucka, Miss Marie Lehky, Mrs. Herbert E. Naatz, Miss Marie Henz, Mrs. Walter Maxim, and Mrs. John W. Hillegas. Mrs. Hillegas, who is Junior Activities Chairman of the chapter, is also National Head of the women's auxiliary of the Academy of Model Aeronautics. Several NAA names also figured in the winners' column for the Junior National Air Races, two of the high-point winners being sons of CWNAA members—Jack Norris, high-point open division flier, son of Mrs. John L. Norris; and Lyman A. Slack, Jr., high-point junior winner, son of Mrs. Lyman A. Slack.

Oklahoma

New officers were elected at the last *Oklahoma City Model Aviation Club* meeting: president, Ray Matthews; vice president, Ed Means; secretary, Jean Means; and treasurer, Frances Matthews. During the month of July the *Oklahoma City* members particpated in three contests. Now the club can go anywhere! Recently Jimmy Jorski's father gave them a twenty-five passenger bus, painted in the club colors—red and white.

Pennsylvania

The *Carlisle Prop Spinners* are looking for another club in their State that would be interested in holding a team racing contest. Write: Roy E. Williams, Jr., 76 West Fouther Street, Carlisle.

Virginia

After two previous attempts, the model builders of Bristol, Virginia-Tennessee, have organized and initiated a most successful model airplane club—*The Tenneva Flying Knights*. President—Claude V. Rigole; vice president—Robert M. Fleming; secretary—James Morrell; and treasurer—R. D. Dickenson. The local Junior Chamber of Commerce sponsored a Fourth of July contest in Bristol, in which members of the *Flying Knights* won 9 of the 16 first place awards. Their sponsor is the Random Mart, Inc., in Bristol, and each week presents a merchandise award for an attendance prize.

New Zealand

The *Auckland Model Aero Club* recently celebrated its twenty-first birthday with a dinner. Mr. F. C. Macdonald, the founder of the club, was presented with an inscribed silver ash tray by the president, Mr. L. R. Mayn. Among those present were representatives of the National Airways Corporation, Tasman Empire Airways, Ltd., Pan American Airways, the *Auckland Model Aero Club*, the Auckland branch of the Royal Aeronautical Society, the *Auckland Gliding Club*, and several modeling clubs. Mr. A. H. Reynolds showed films he had produced, relating to modeling, gliding and Air Force activities, and a colored film of a flight over Auckland in a flyingboat. Thanks to the secretary of the *Auckland Model Aero Club*, B. B. Marsh, for this information.

COMING CONTESTS

September 11, PA.—Burgettstown, Hillman's Model Airport, Team Competition.
September 18, PA.—Burgettstown, Hillman's Model Airport, RC.
September 18, ILL.—Chanute Field, Air Force Base Contest, AMA sanctioned, U.
September 18, PA—Burgettstown, Hillman's Model Airport, U Championship.
September 18, PA.—Pottstown, 5th Annual Gas Model Meet, at Daniel Boone Homestead, AMA sanctioned, by *Pottstown Strawbenders*.
September 18, CALIF.—Antioch, *Antioch Prop Busters*, U.
October 2, CALIF.—Stockton, *Stockton Gas Model Association*.
October 9, CALIF.—Modesto, *Modesto Flying Circus*, U.
October 15-16, NEVADA—Las Vegas, Annual Western States U-Control Contest, by *Nevada Aeriites*, AMA sanctioned.

U—Controline; F—Free Flight Gas; R—Free Flight Rubber; G—Glider; RC—Radio Control; W—Water Events R.O.W.; S—Scale; I—Indoor.

PHOTO CREDITS

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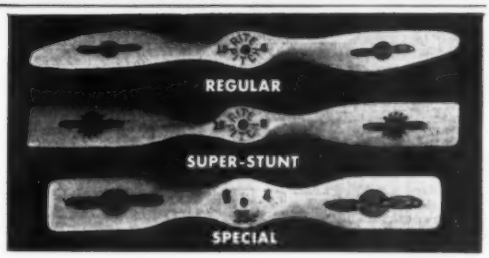

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Civy Boy 74

(*Continued from page* 15)

cement into place in the fuselage sides. While these fuselage sides are pinned down to the plans and drying, cut the wing saddle from 3/16″ sheet balsa and from 1/8″ sheet cut the stabilizer saddles. When the fuselage sides are dry, separate the two and cement the cross pieces in place between the two sides, using pins and small rubber bands to hold while drying.

From the plans it can be seen that bicycle spokes and nipples are used to hold the firewall to the fuselage. Two spokes and two nipples are required. These can be obtained from your local bike shop.

From 1/16″ plywood cut the sub-firewall; after sanding the front of the fuselage box with a sandpaper block to make sure it is square and flat, cement the sub-firewall into place. Cut two bike spoke fuselage anchors from 1/16″ plywood and cement in place where indicated on plans. Drill two holes 5/32″ diameter in sub-firewall as shown on plans and install the bike spokes—cut to proper length, of course. Note: at least 1/2″ of the spoke length is bent to hook behind the 1/16″ plywood used to anchor these spokes. Cement firmly in place. The end of the threads on the bike spokes should protrude 1/16″ through the 5/32″ holes in the sub-firewall.

Cut firewall from 1/4″ plywood. Drill two holes—one in each side, as in the sub-firewall, 5/32″ diameter. The two bike spoke nipples should fit these two holes. The nipples must thread on to the bicycle spokes protruding through the sub-firewall. The firewall can be removed from the model at any time by simply unscrewing the two spoke nipples with a screw driver. This is a neat and clean system. After flying is over for the day, the builder can remove the entire motor unit from the ship for cleaning or transit. The two bike spokes also serve another fine purpose, if the model is to be operated on spark ignition. See diagram on plans. In such a case, the bike spokes are part of the wiring circuit, allowing the builder to have the facilities of a removable firewall and not having to have a separate jack plug to connect to the ignition timer, which most builders prefer to place back along the fuselage.

At this point we have the fuselage box frame finished, with firewall and sub-firewall installed. Check the pylon blank to make sure it is dry, then shape it to a symmetrical section, viewing from the top view. Sand the bottom of the pylon straight and even with a sandpaper block, making certain that you have not more than 3/16″ incidence built into the pylon. Notch the pylon base to fit fuselage cross members and cement into place; the wing saddle can now be cemented in place on the pylon. Check pylon and saddle for alignment with fuselage, and pin securely until dry.

Add the fuselage stringers (1/8″ x 1/2″), as shown on plans. If 3′ lengths of wood are used, the stringers will have to be spliced. Again, it is best to stagger the splices to insure strength. The fuselage has two side stringers 1/8″ x 1/2″. Note that the top side stringer travels all the way to the stabilizer trailing edge. The lower side stringer stops at the leading edge of the stab. Taper the stringers with knife or sandpaper from about the midway point on the fuselage to 1/8″ x 3/8″ at the leading edge of the stab saddle position, continuing the taper on to the very end of the fuselage. At this time cement stabilizer saddle in position. Check the drawing and cement the two small balsa blocks about 1″ in from the end of the fuselage. Carved to shape, these small blocks form the rear end of the fuselage. Before planking the fuselage, insert 1/8″ x 1/4″ strips along entire pylon base from nose of ship to the rear end of pylon, to receive the top side fuselage planking. The grain of all planking should be placed perpendicular to the longerons and stringers. Plank the rear section of the fuselage with 1/16″ sheet, and the front or nose section with 1/8″ sheet. The pylon fillets are shown full size and should be made from soft pulpy balsa 3/32″ thick. Sand a long taper, or bias, all around the fillet edge and cement in place.

Assemble both wing tip outlines after the curved parts are cut from 1/4″ sheet. Cement well. Laminate the leading edge and around the tips of the wing with 1/4″ sheet. While the tips are drying, cut the wing ribs by making templates from full size patterns. Wing center section ribs are cut from 1/8″ sheet; dihedral break ribs are also made from 1/8″ sheet. All other ribs are from 3/32″ sheet. Wing spar sizes are indicated on the plans. Note that the wing tip spars are tapered from rib No. 5. All dihedral breaks in the wing are made by laminating spars. Assemble the wing after ribs are cut and notched, spars cut to length and tapered, and wing tip outlines are dry. Lay out complete outline of one wing, then slide ribs on to the spars one section at a time, and cement into place. Do not cement the dihedral break ribs in place on the spars until the wing frame is dry. Block up wing to required dihedral (see plan), and cement the overlapping spars and the 1/8″ dihedral break ribs. Shape the leading and trailing edge to conform to the airfoil, and the wing tip outlines to conform to the airfoil ribs. Add 3/16″ sheet hard balsa gussets to leading and trailing edge dihedral breaks. Plank top and bottom center section of wing with 1/16″ sheet as shown on plan. Sand the whole job thoroughly.

The stabilizer is very simple to construct. Stab tips are made by laminating 1/4″ sheet and 1/8″ sheet as shown on plan. Cut the curved parts for the stabilizer tips to plan form, then add leading and trailing edge stock. Plank bottom center section of stab over the plan. Cut and cement the lower cap strip ribs into place. Splice the stabilizer spars at the center section. Spar sizes are, from leading to trailing edge, 1/8″ x 5/8″, 1/8″ x 5/8″, and 1/8″ x 1/2″. Note: these spars begin a gradual taper from rib No. 5 (see plan) to each stab tip.

Cut rudder outline pieces from 1/4″ sheet balsa, using 1/8″ x 1/4″ for rudder spar and ribs. Add 1/8″ square on each side for rudder ribs, and shape the rudder to symmetrical airfoil shape. Sand rudder and cement into place on stabilizer. See drawing for fitting the stabilizer cone to the fuselage.

I covered my own models with Japanese tissue and after two coats of clear dope, I applied whatever numerals necessary; the license number was cut from black Japanese tissue. If tissue numerals are used, dope them on after the second coat so that they may receive the same gloss as the covering. As an added hint, black tissue numerals are far superior to decals in the respect that they do not chip, crack, or peel off. I used 10 to 12 coats of clear dope, with 10% castor oil added to the last two coats to prevent warps.

Test flying and adjustments: Before test gliding the *Civy Boy*, check to see if

it balances slightly nose heavy by holding it at the trailing edge of the wing. This is a good condition. If it is tail heavy, add a little weight to the nose. Also check to see that you have no more than 3/16" incidence in the wing, the stabilizer being set at zero. Before test flying, add six degrees down thrust in the engine installation.

The *Civy Boy* flies equally well to the left or right; I usually fly my own to the right under power, and also glide to the right.

Use of "wash in" in the wing panel toward which you circle under power is recommended. This gives the model a nose-up spiral with no hint of spiralling down. With this configuration it is advisable to make the ship glide toward the same direction it climbs. This will encourage a nice flat recovery at the end of the motor run. It has been felt by some observers that a long-momented model with a trailing edge C. G., such as the *Civy Boy*, does its best flying in calm air or little wind. This the designer does not agree with. Many contests have been won by this long-momented design on rough windy days. More contests have been won in the wind than in the calm, due to general or local weather conditions. However, the flying proficiency that a model exhibits on a windy day depends upon the amount of time spent on adjustment by the flier. Any model requires a slightly different adjustment for windy day flying than it does for flying in calm, balmy weather.

It is suggested that the *Civy Boy* be trimmed with less positive incidence for windy weather. In the author's opinion, this sort of adjustment applies to almost any model airplane free flight design. Place a small strip of 1/16" sheet balsa under the leading edge of the stab, thus decreasing over-all incidence to 1/8". If the builder does not desire to tamper with the incidence, try balancing the model about 1" forward from the trailing edge of the wing. This will enable the model to glide two to three miles per hour faster; when flying in a gusty wind this will tend to dampen the slight stall that any model may exhibit when it turns from the downwind leg into the wind.

For those who wish to give the design a try, installation of a good dethermalizer is virtually a must. When this article was written I had already lost four *Civy Boys* since April of this year—one *Civy Boy 74*, two class B versions, and one class A flown R.O.W. What is the author building now? Better dethermalizers for certain!

Radio Control Reliability

(*Continued from page* 33)

though, we like the small airplane because you can put it in your car and still get the wife and kids in, without having to resort to prayer.

Unfortunately there is no such thing as a receiver that requires simply the flip of an ON-switch to be ready for operation. With such light weight requirements, this feature will probably never be realized. So don't think that your receiver is not airworthy. Knuckle down and learn how to operate it.

Here are supplementary instructions for your RK61 receiver. These instructions are the result of considerable experience. Individual experience and practice may call for slight revision here and there but on the whole, they should serve to greatly increase the reliability of the receiver for the average user.

Assuming that the receiver has been installed and connected properly, the

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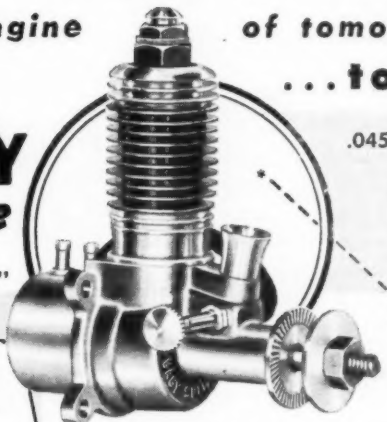

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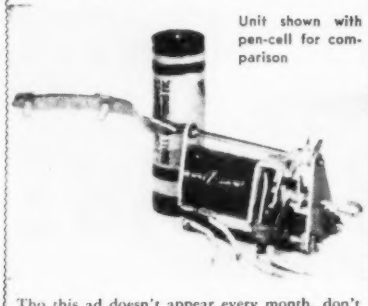

Unit shown with pen-cell for comparison

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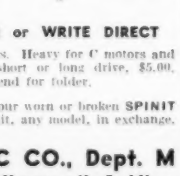

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operator should practice and become thoroughly familiar with the following ten-point check list. Once a receiver is adjusted properly and known to be in good condition, only items 3, 4 and maybe 5 will need a repeat check in the field.

1. Voltage check
2. Relay adjustment
3. Idling plate current
4. Transmitter tuning
5. Receiver antenna coupling
6. Antenna length
7. Receiver tuning
8. Meter wabble
9. Receiver response
10. Vibration

These check items are listed in the approximate order in which they can be made on a new receiver installation. Actually, they are made more or less simultaneously since they are inter-related and dependent on each other. Also, it takes much less time to do, than to read.

1. *Voltage check.* This is obvious. The RK61 receiver works best when A voltage is not less than 1.4 and B voltage is above 45. With the battery charger described in the March, 1949, issue of this magazine, it is an easy matter to keep batteries fresh. The use of a Centralab #NS13-25,000 ohm potentiometer in the B supply and either two #412E hearing aid batteries maintained well above 45 volts with a charger or two 413E batteries (a total of 60 volts) is highly recommended. The 60-volt batteries will require little or no charging.

2. *Relay adjustment.* The relay adjustment should always be checked on a new receiver. Once made, this adjustment seldom needs repeating unless a crash landing warrants it. The *Sigma* relay is easier to adjust than the *Kurman* (which is used in Aerotrol) because it is more rigid, and has screws for contact and spring adjustment. The armature of any relay should never touch the iron pole piece of the coil because sticking will result. The *Sigma* relay armature should be adjusted so that at 1.5 ma., light can just be seen between the armature and the pole. It is good practice on the *Kurman* relay to glue one or two thicknesses of tissue paper over the iron pole of the coil. This spacer is not necessary on the *Sigma* because of its extra rigidity. Detailed instructions for relay adjustment are not given here because experience shows that the operation must be understood rather than memorized for best results.

After the armature to pole gap is adjusted as above, there are two points to understand. Generally speaking these are (a) the contact spacing is used to adjust the relay sensitivity or pull-in to drop-out range on the meter scale, and (b) the spring tension is used to adjust the point of relay operation on the meter scale. The relay can be completely adjusted without use of a transmitter if the recommended 25,000 ohm potentiometer is used. Slowly swing the plate current with the potentiometer and note the pull-in to drop-out range on the meter. We want this to be about 0.1 ma. If it is much more, the contacts are spaced too far apart. Use only the "live" contact to bring them closer together since the "dead" contact (on the *Sigma* relay) has been set to control armature gap. If the pull-in to drop-out range is too small, move the contacts further apart. If the relay operation is difficult to hear, use the noise of the control escapement. Now adjust the spring tension to bring the operating range to the proper place on the meter scale. We want this to be around 0.8 to 0.9 ma. Increasing the spring tension will raise the operating point, while decreasing spring tension will lower it. Very little spring adjustment should be used; if too much is required, the contact spacing may need readjustment to maintain the 0.1 ma. operating range.

3. *Idling plate current.* This check is very common to the receiver and, of course, should be done in the field before each flight. An idling current of 1.1 to 1.3 ma. is to be recommended over higher currents because of increased tube life; 1.1 is preferred and can be used with the *Sigma* relay without fear of vibration effects. The *Kurman* relay should be operated at 1.2 ma. Care should be taken in using the potentiometer not to turn it the wrong way, as each surge of high current means that much shorter tube life.

4. *Transmitter tuning.* It is assumed that the transmitter is the commercial version that comes with the RK61 receiver. A new transmitter should be checked with the antenna on and clear of metal objects to see that the plate circuit draws at least 30 ma. If not, the antenna coupling coil should be moved in or out until it does. For flight operations, all work should be done with the transmitter antenna connected to prevent de-tuning. For bench testing, this is not necessary. The fact that the transmitter, with 135 volts and antenna connected, gives too strong a signal for accurate tuning, is taken care of under test item number 7. Tune the transmitter so that you get the lowest receiver plate current reading (0.1 to 0.3 ma.) as usual.

5. *Receiver antenna coupling.* Set the transmitter up in an open area, or on the flying field, with antenna connected. Have a friend stand by to operate it. Set the ship on the ground at least 100' away (20 normal steps) and off the end of the antenna to avoid too strong a signal. Place the meter in the receiver circuit, turn the receiver on and call for transmitter on. Swing the antenna coupling condenser for minimum plate current reading on the receiver. This may or may not be lower than that obtained in step 4. Now turn the condenser back until the plate current just barely starts to rise. This is considered the optimum setting for a new tube. An ageing tube will require more antenna coupling than this, or enough to stop meter wabble as described under test item No. 8.

6. *Antenna length.* When a new receiver is installed, the antenna length should be as recommended by the manufacturer. The best length may vary according to the arrangement of wiring in the airplane and the age of the tube. With the ship still at least 100' off the end of the transmitter antenna, try 4" more and 4" less antenna and repeat item 5. The best antenna length is the one that will give the lowest plate current reading (signal on) with the least antenna coupling of step 5. The antenna coupling adjustment is far more convenient than antenna length adjustment and they accomplish almost the same thing. However, increasing the antenna coupling raises the minimum plate current reading available with signal. To avoid too much of this, the antenna length adjustment must be resorted to especially as the tube gets older. Generally speaking, the older the tube, the more antenna length required. The antenna seldom requires lengthening in the field because step 5 is usually sufficient to get by for the day.

7. *Receiver tuning.* Still with the ship away from the transmitter and with signal on, here is a simple way to check transmitter tuning. A polystyrene screw driver is needed. Polystyrene is a very good insulator for radio frequency current and should be used in preference to other plastic materials, or wood. Radio stores sell these screwdrivers, or better yet, buy a length of rod and make a long one. Place the screw driver between the two end loops of the receiver tuned circuit coil, and spread these loops apart very slightly. This raises the operating frequency of the receiver. If the transmitter was previously tuned to the receiver, the receiver meter will rise. If it does not or if it reads less, the transmitter frequency is too high. Either re-tune the transmitter, or spread the receiver coils a little more until the meter stays down. Don't do too much coil spreading as this effects the receiver in other ways and may require the re-check of items 5 and 6. To lower the receiver frequency, push the top of the end loop of the tuned circuit coil so that it bends in very slightly. Observe as before—if the meter goes down, the transmitter frequency is too low. In this test, care should be taken to keep the hands well away from the ship as body capacitance might confuse the action.

8. *Meter wabble.* Wabbling of the meter

pointer while the receiver is idling at or near 1.1 ma. indicates fluctuating plate current and since the meter cannot follow all of this plate current change, the amount of change is even greater than indicated. The condition can become bad enough in flight to trip the relay. Meter wabble is an indication of tube aging. New tubes should not show meter wabble. At the first sign of meter wabble, increase the antenna coupling capacitance enough to stop it. With further aging of the tube, a point will be reached where further antenna coupling will cause erratic and improper receiver operation. The plate current may go down on signal and never come up, or it may never go down on signal at all. At this point, we resort to increasing the antenna length several inches (by trial and error) and at the same time reduce antenna coupling as in item 5. If the above procedure completely eliminates meter wabble, it is still safe to operate at 1.1 ma. idling current. A point will be reached in tube life where this procedure will not completely stop meter wabble. At this point we resort to using an idling current that is progressively higher until the wabble stops. As high as 16 ma., or even more, can be used so as to prevent the plate current fluctuations from reaching the relay operating point. At this stage, the 60-volt B battery is capable of producing safe tube operation. The tube life at this point is well beyond the published 8 to 10 hours. Finally a point is reached where all the extra attention required is well worth the price of a new tube.

9. *Receiver response.* Finally, before taking the ship back to the transmitter, have the friend send rapid pulses. The receiver should follow. If it misses a few, better leave it alone since flying any escapement control like Rudevator does not require very rapid pulses. However, if response is too slow, more antenna coupling capacitance may be required. Repeat items 5 or 6 or both carefully and improvement is certain.

10. *Vibration.* This test is covered in other instructions but is added here because it is actually the last test that is done before launching the model. With the engine running, hold the ship off the ground while your friend sends signals. If the control chatters through more positions than signals are sent for, then either a wire connection is loose or the receiver is mounted too rigidly which allows the relay armature to vibrate. This latter is *very unusual.* If the control still chatters through positions with the receiver off and servo (control) power off, the engine is shaking the ship too hard. More spring tension will be required on the escapement armature. At any rate, don't launch that ship until it is right. A ship in the hand is worth two in the next county.

Flash

(*Continued from page 5*)

wing airplane needs a large angle of incidence for high-lift at low speed for landing but a small or zero angle of incidence for high-speed flight. Various high-lift devices are used, including both nose and trailing edge flaps, etc. Martin believes they can solve the age-old structural problem of the variable-incidence wing. The new bomber is expected to fly early this fall. The next step is the variable-angle-of-sweep fighter or bomber and then the superspeed airplane will be as tame as a transport for take-off and landing.

AIR FORCE continues to foster development of the prone pilot position since it not only greatly reduces the fuselage thickness required, and therefore the drag, but permits the pilot to take two or three times the "g" load that he can sitting upright. After experimental tests with a nylon bed position in the nose of a Boeing B-17 bomber, Air Force is now ready to try out the idea in an F-80 jet fighter. Stanley Aviation Corporation, Buffalo, N.Y., created by former Bell test pilot Bob Stanley, has received a contract to install the nylon bed in an F-80 and give the device a thorough flight test. The prone pilot will be

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JUST TO keep all our designation fans straight, the letter for Piasecki helicopters has been changed from "J" to "U," in line with the new Naval terminology for "utility" aircraft. The new XHJP-1 Navy helicopter has thus become the HUP-1, and if you've ever made a fast flare landing in a helicopter you'll know where they get the "HUP"!

U. S. MANUFACTURERS have sat idly by for the past four years and watched the British develop the turboprop engine from an experimental turbojet with a geared propeller shaft hooked onto the compressor to a highly successful production item. Reason was twofold: no U. S. airline or manufacturer had the money to put up for the costly development program and Air Force concentration on the turbojet is rapidly reducing its fuel consumption to a point somewhere in the near future where the pure turbojet airliner may be practical. But at least one manufacturer, Convair, may be the first U. S. builder to fly a turboprop-powered airliner. Allison has developed several experimental turboprop engines. One of these units, the T-38, has been flight tested successfully. When two T-38 units are geared together, the result is a T-40 engine, and four of these latter units are scheduled for the Convair XP5Y-1 flying boat, now complete, except for the engines, for the Navy. The close engineering coordination between Convair and Allison has led to exploration of the idea of installing two T-38 units in a Convair Liner for experimental flight testing. Thus, both problems will be solved since a turboprop engine on which development costs have been underwritten by the Navy, will become available for an airliner.

WE WILL be the first to admit that the jet-powered fighter is a difficult mechanical device to understand and, even more so, to explain to youthful enthusiasts on paper. And so one of the very best and certainly the most practical demonstration available of the important differences between the piston engine-propeller combination and the turbojet engine was carried out by the Navy. A Grumman F8F *Bearcat* fighter, powered by a Pratt & Whitney R-2800 reciprocating engine, was recently pitted against a North American FJ-1 fighter, powered by an Allison J-35 turbojet engine. If you follow this closely, the whole subject should be much more clear: both planes lined up on the runway and gunned their throttles together. Result: the *Bearcat* beat the FJ-1 *Fury* to 15,000' by more than one full minute! (This is because the propeller converts 1 hp into as high as 3 lb. of thrust at speeds less than 500 mph., whereas the turbojet engine produces only 1 hp for each pound of thrust at about 375 mph.) This difference is so marked that the *Bearcat* got to 5000' before the *Fury's* wheels were even off the runway, believe it or not! BUT—what happens when both airplanes get up to a speed of about 500 mph. with both airplanes flying at full speed at 1000', both suddenly zoomed up into a steep climb. Result: the *Fury* beat the *Bearcat* to 10,000' by 13 sec. and was really getting up a head of steam in its climb when the *Bearcat* stalled out at 15,000'. This is because at this speed, the efficiency of the propeller drops off to where it is converting a pound of thrust into only one or less horsepower whereas the jet engine is delivering upwards of 2 hp for every pound of thrust. Thus, there is no one best engine: it all depends on the speed at which you want to fly!

TOUJOURS ROADABLE—that is the watchword in the lightplane field. No sooner does one fly, big production is promised and nothing materializes, when another is announced. Latest is the Taylor car of Longview, Wash., designed by Moulton B. Taylor. It seats three and weighs only 850 lb. It is powered by a 100 hp Franklin engine and cruises at 45 mph on the road. A cable drive extends rearward and upward to a pusher propeller when the wings are attached and the car becomes an airplane. Taylor is issuing stock to obtain capital for the production of ten units in order to test their sales ability.

IF YOU HAVE been wondering what ever happened to the Northrop Flying Wing bomber, a newly-revised schedule of modification indicates that extensive changes are due. All told, 15 Flying Wing bombers were built of which 13 were to have been B-35 propeller-driven models and two YB-49 eight-jet versions. One of the YB-49's was destroyed in a crash. Of the remainder, one will become an EB-35B powered by six Allison J-35 turbojet engines and one Northrop XT-37-1 *Turbodyne* turboprop engine capable of 10,000 hp. Six more will be powered by six turbojet engines and used for research tests on Flying Wing aircraft stability and control and tactical possibilities. One B-35 propeller-driven model will be retained in its present form for further tests. One YRB-49A will be powered by six turbojet engines and carry full long-range tactical reconnaissance combat equipment. The remaining four airframes will be "cannibalized" for parts for the flying models. It will be remembered that an order for 30 RB-49A jet Flying Wing photo-recon planes was cancelled in favor of additional B-36 propeller-driven bombers.

FOR MANY MONTHS new Air Force jet fighters have been equipped with ejection seat equipment to enable them to be thrown clear of the fast-flying airplane, since the slipstream would make it impossible to climb out of the airplane and fall clear. This is a very valuable safety device: except that nobody had ever tried it! But now theory has become fact and ejection seat escapes have now been made at a speed of 550 mph. A two-seat Lockheed TF-80C was used for the tests, which were conducted out over the Pacific Ocean with rescue craft standing by. But the Russians are not to be outdone in this high-speed bail-out business and they report a "world's record" with a jump by Pilot A. Bystrov from an airplane flying at 474 mph at an altitude of only 6300'. The thing that may really make this a record is the fact that this report does not mention an ejection seat and if Bystrov simply stepped outside at 474 mph we think he deserves a world's record—or a shroud, depending on how he came out of it!

WITH APPROVAL of "lightplane" airlines by the CAB, the market for small transport aircraft looks far more promising and Beech has announced the Model 50 *Twin Bonanza* seating five and powered by two 185 horsepower Continental engines. The new design uses only a single vertical tail, in contrast to the "butterfly tail" of the standard *Bonanza*. Beech estimates a price tag of $30,000 on the new model. Spartan Aircraft Co., Tulsa, Okla., has also dusted off its *Executive* five-seater and likewise put a $30,000 price tag on it. This airplane is a prewar single engine design in which a tricycle landing gear has been installed. But the several feeder lines certificated by the CAB are making definite plans to start "lightplane" service with Cessna 195's and Ryan *Navions*, both single-engine types seating four.

THE HELICOPTER is not noted for its speed and so the helicopter speed record has merely inched up over the past three or four years and the speed itself is hardly enough to cause a ripple of excitement among jet fans. However, as a technical achievement the recent record-breaking flight of the Sikorsky S-52 at an average speed of 129.166 mph is important. The forward speed of a helicopter is limited by the fact that the downwind rotor is susceptible to stalling of its blades when the flow past (forward) the airfoil drops below a minimum speed. The obvious solution is to speed up the rotor speed but this introduces compressibility problems on the upwind rotor, which has its own speed plus the forward speed of the craft as the total speed of the airflow over the blade. The new achievement brings the record back to the U.S. from England, where it was held at 124.3 mph by the Fairey *Gyrodyne*.

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among this month's 4-Star Crescent Selections. Check off choices for immediate order. See easy instructions below.

OHLSSON & RICE 29. "Built to roll for U-control"—all-new engine built by Ohlsson & Rice for maximum Class B power. From $11.95.

O & R DeLuxe 23. Rollerized—rotarized—revolutionized. Every latest feature in the world's largest selling model engine. From $10.95. New National Champion Class B!

SnapORPak. Handy new starting accessory for all engines, eliminating need for clumsy short-causing alligator clips. 35c.

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O & R Infant Glow Plug. For K & B Infant. 65c.

(Illus. 29 engine)

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"Checkered Flag Line"

19-McCoy Power for beginners. From $10.95. Sportsman 29—superb Class B performance. From $11.95.

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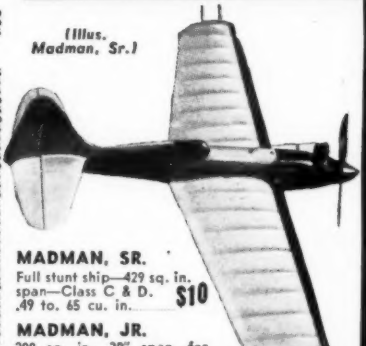
DeLuxe Airwheels—Semi-Pneumatic Wheels—Streamline Spongewheels—Balloon Spongewheel. A wheel for every ship and purpose! *See prices adjoining.*



(Illus. Madman, Sr.)

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Full stunt ship—429 sq. in. span—Class C & D. .49 to. 65 cu. in. **$10**

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288 sq. in., 39" span, for Class B—.23 to .49 cu. in. **$6.95**

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BRITISH SE 5
Famous warcraft from World War I—Triplane, $3.50—SE 5, $4.95.

ATLAS STRANDED WIRE
With snaps and rings. See price list.

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*O&R 29	$13.95
*O&R 60	11.95
*O&R 60 Pak	14.95
*O&R 19 & 23 Std.	9.95
*O&R 19 & 23 RV	10.95
*McCoy 60	27.50
*McCoy 49	25.00
*McCoy 29	19.50
*McCoy 19	10.95
*Super Cyclone 60	12.95
*Dooling 61	35.00
*Spitfire 64	34.95
*Orwick 64	27.50
*Orwick 29	21.50
*Fox 59	29.95
*Super Champ 62	14.50
*Triumph 51	15.95
*Triumph 49	14.95
*K&B Torpedo 29	18.50
*K&B Torpedo 24	16.50

Glow Plug Engines

*O&R 29	12.95
*O&R 29 Pak	11.95
*O&R 19 & 23 RV	9.95
*O&R 23 RV Pak	8.95
*K&B Glo Torp 32	14.95
*K&B Glo Torp 29	14.95
*K&B "Infant" 02	2.95
Glo Devil 62	12.50
*Triumph 49	12.95
*Triumph 51	12.95
*Sportsman Sr. 59	16.95
*Sportsman Jr. 36	14.95
*Sportsman 29	9.95
*McCoy 19	9.95
*McCoy 19 Race Car, (with pinion gear)	10.95
*Thimble Drome 099	9.95
*Thimble Drome 15	9.95
*Thimble Drome 199	10.95
*Baby Spitfire 045	5.45
O.K. Cub 049	5.95

Air Engines

Campus A-100 w/tank	5.95
Campus Bee w/tank	4.95
O.K. CO2	4.95

Jetex Engines

Jetex 350	12.50
Jetex 200	8.50
Jetex 100	4.95

Control Line Kits

*The Chief (C)	5.95
*Joker (C)	5.45
*Casalaire (C)	4.75
*Madman, Sr. (C)	10.00
Super-Duper Zilch (C)	5.95
Stuntwagon (C)	7.50
A.J. Fireball (B-C)	7.95
Howard Pete (B-C)	5.95
Monocoupe (B-C)	4.95
Mr. Mulligan (B-C)	4.95
Flv. Station Wagon (B-C)	5.50
Sky Box Trainer (B-C)	4.25
Super Sky-Box (B-C)	4.95
Lil Duper Zilch (B)	3.95
*Brave (B)	3.95
*Jester (B)	3.95
*Curtiss PI-A (B)	9.95
*Warrior (B)	3.95
*British SE-5 (B)	4.95
*Madman, Jr. (B)	6.95
Speedwagon 30 (B)	3.95
Stuntwagon 30 (B)	4.95
Nifty (B)	4.95
Zing (B)	4.95
Trainee (B)	3.95
Tc 2 Trainer (B)	2.95
Lockheed Sirius (B)	4.95
New Era (B)	3.95
Stuntmaster (A-B-C)	4.95
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Beechcraft (A-B)	5.95
Piper Vagabond (A-B)	3.95
Dynamic (A-B)	3.50
Glo-Bug (A-B)	2.95
Maverick (A-B)	1.00
*Jeepers (A)	2.95
*Invader (A)	5.95
*Fokker-Tripe (A)	3.50
Speedwagon 20 (A)	3.95
Super Fury (A)	2.50
Winnie Mae (A)	2.95
Whirlwind Jr. (A)	2.95
Super Solution (A)	2.25
Swee' Pea (A)	2.50
Howard "Ike" (A)	2.95
Buster (A)	2.50
Baby Sky Box (A)	3.50

"AA" Control Line Kits

Puddle Jumper	1.00
Infant Wagon	1.75
Baby New Era	2.50
Baby TC-2	1.98

Free Flight Kits

Luscombe Sedan (C-D)	7.50
Playboy Sr. (C)	6.00
Zoomer (C)	3.95
Playboy Jr. (B)	2.25
Zipper (B)	5.95
Powerhouse (B)	4.95
Super Brigadier (A-B)	3.95
*Zeek (A-B)	4.95
*Miss Tiny (A-B)	3.65
*Spook 46 (A-B)	4.95
Zipper (A)	2.50

"AA" Free Flight Kits

*Civy Boy 24	1.25
*Civy Boy 31	1.65
*Small Fry	1.25
*Bambino	.95
Profile Powerhouse	1.00

Accessories

U-Reely Control	8.50
U-Reely Remote	12.50
Metal Reel	1.25
*Wood Reel 6" dia.	.50
*Wood Handle	.50
*2-52½' Stranded wire	2.75
*2-60' Stranded wire	2.95
Powerhouse "33"	$ 1.50
Cleve. Minnow	1.00
*2-70' Stranded wire	$ 3.25
*2-3' Leads tins	.40
Spark Plugs (all sizes)	.50
*O&R Glow Plugs (all)	.65
"K&B Infant"	
"Baby Spitfire"	
"Ok Cub"	
1/4 x 32	.35
Metal Condenser	.30
1/4 x 32 Racing	.50
*Booster Plug & Socket	.50
3/8 x 24	.50
Toggle Switch	.25
3/8 x 24 Racing	
Slide Switch	
*Infant Glow Plug	.85
Neoprene Tubing	
*Spitfire Glow Plug	.85
3/16" O.D. Ft.	.20
Arden Glow Plug	$ .85
Champion Glow Plug	.75
*Firecracker Coil	2.75
*Competitor Coil	1.95
Aero Ft. Wt. Coil	2.50
Aero Quality Coil	3.00
Aero Condenser	.35
Metal Condenser	.30
*Booster Plug & Socket	.50
Toggle Switch	.50
Slide Switch	.25
Neoprene Tubing	
3/16" O.D. Ft.	.20
1/4" O.D. Ft.	$ .20
Ignition Wire Ft.	.03
Silkspan 00	.05
Silkspan GN	.10
Wet Strength Tissue—Red, Yellow, Blue Sheet	.10
Jap Tissue (White)	.05
Elmic Timer	2.50
D-E Fuel Shut-off	1.00
*Austin Timer	1.50
*Baby Timer	1.50
*Flex Needle Valve	1.00
Universal Needle Valve	.50
*Battery Box (all sizes)	.40
*Lucite 4-pencil B. Box	.75
Strap Hinges (8)	.20
*Bell Crank (L-Sm.)	.25
*O&R 60 Metal Fuel Tank	1.75
*O&R 23 & 19 Fuel Tank	1.50
*Master Stunt Tank (Med.)	1.25
*Maeco Stunt Tank	1.25
*Baker Wedge Tank (Lg. Med. Small)	1.25
*Baker Tiny Tank (K.D.)	.35
*Mart-Lee Mufflers:	
Class A (4")	1.95
Class A & B (5")	2.95
Class C & D (6")	2.95
Class B-C-D (5½")	2.95
*Counter Balance (B&C)	1.75
1-blade Prop (B & C)	.50
*Baby Spitfire Prop	.35
"Infant" Power Prop	.25
*Snap-or-Pack	.35
*O&R 60 Rotary Valve	6.00
*O&R 23 Rotary Valve	5.00
*4-way plug wrench	.50
*Austin Glue Gun	.75
*Austin Fuel Can	.75
*Turbo Fuel Can	.85
*Turbo Fuel Pump	.69
*Hap-The Pilot	.95
*Veco Wheels (Pr.): Airwheels—2½" $2.50. 3½" $3.00, 4½" $3.50.	
Semi-pneumatic—2" 85c, 2½" $1.00. 3" $1.50.	
Streamline—1⅞" 48c, 2⅜" 60c.	
Balloon Spongewheels—⅞" 20c, 1" 25c, 1⅛" 25c, 1¼" 30c, 1⅜" 30c, 1½" 35c.	
¼" English Rubber @ 2½c ft.	

Tools

Moto-Sander & Polisher	14.85
Dremel Moto-Tool ⊇2	23.50
Dremel Moto-Tool ⊇1	17.50
Dremel Moto-Saw	5.85
X-acto Chest ⊇86	10.00
X-acto Chest ⊇87	15.00
Hobby Hand Drill	1.25
*Ungar Soldering Kit	2.25

Gas-Powered Boat Kits

Vinyard Sedan Cruiser	5.50
Marco Cruiser 25"	5.50
Chris Craft 26"	5.50
Chris Craft Express	5.50
Chris Craft Runabout	5.50
Owens Flagship 26"	5.50
Dumas Elec. Drive Unit	4.00
Buckeye Speedboat	4.95
Elco Cruiser	4.95

Misc. Boat Kits

Schooner Bluenose 22"	3.75
Sov. of Seas 23"	3.75
Cutty Sark 24"	3.75
Tug Boat 14½"	3.75
Destroyer Preston 24"	4.50
Coast Guard Campbell 22"	4.50
Rev. Cutter Hamilton 22"	4.50
Privateer Rambler 23½"	4.50
Oil Tanker 20½"	4.50
Constitution 22"	6.00
USS Kearsarge 32"	9.00
Flying Cloud	9.00
Marion Sprague 29"	9.00
Santa Maria	15.00
Viking	9.00
PT-10	6.00
Gertrude Thebaud	14.25
Elco Cruisette 27"	12.00
Queen Elz. w/elec. motor	4.95
Reuhl Racing Yacht	8.95

Racers

*Thimble Drome w/engine: Lightning Bug .199	21.50
DeLuxe Chrome Plated	25.00
Champion .15	19.95
DeLuxe Chrome Plated	23.50
Doodle Bug .099	19.95
DeLuxe Chrome Plated	23.50
Champion Tether Model	3.95
T.D. Geared Drive Unit	3.95
Adapter for Drive Unit	1.95
Challenger, Jr.	3.95

Misc. Kits

1909 Model T Ford	2.95
1910 Model T Ford	2.50
1911 Maxwell	2.50
Oldsmobile	1.95
Stanley Steamer	3.95
Amoskeag Steamer	6.50
Clipper Clock	6.50
*Shadow Box	2.00
*Copper Craft	1.00
*Cigarette Cart	.39
*Rolling Pin Planter	.89
Conestoga Wagon	2.85
*Brougham	1.95
*Horseless Carriage	1.50
*Surrey w/fringe on top	1.75
*Victoria w/calash top	2.35
*Covered Wagon	3.95
*Stage Coach	3.95
*Mexican Ox Cart	2.25
*Sportsman Convertible	2.00
*AV8 Hot Rod	1.00
*JV8 Hot Rod	.85
*Jeepster	1.00
*DeLuxe Midget Racer	1.50
*Wishing Well	1.95
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Hawk F-84 (plastic)	1.00
F-80C Shoot. Star (plastic)	1.00

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19" WINGSPAN — FOR "CUB" "INFANT", "SPITFIRE" JR. GAS AND CO_2 ENGINES.
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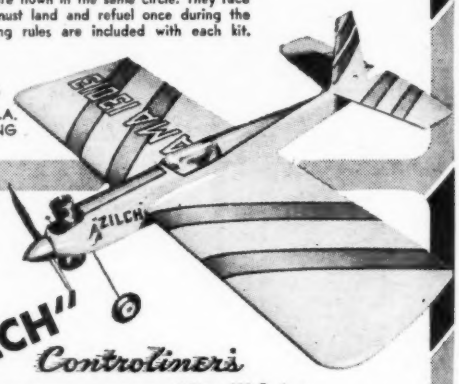

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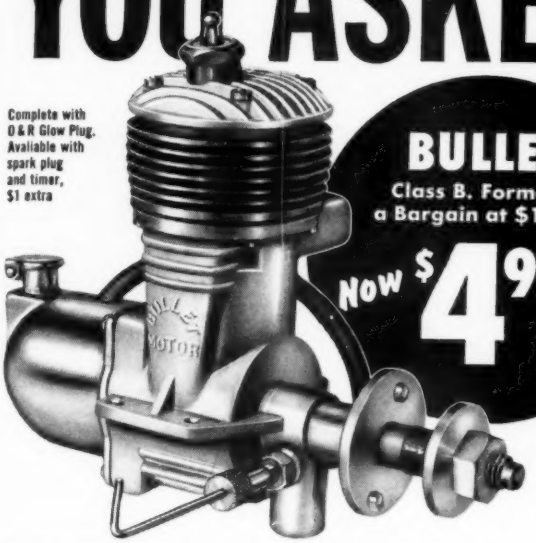

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MORE BULLETS AND TORPEDO SPECIALS AT SENSATIONAL PRICES!

The spectacular close-out sale of the famous Bullet and Torpedo Special motors has been phenomenal! Thousands of hobbyists in every section of the U.S. and foreign countries have taken advantage of this terriffic offer and still the orders pour in! Fortunately for you, we had enough additional parts on hand to assemble a limited quantity of additional motors. They are now completed, tested and ready to ship to those lucky people who get their orders in right away.

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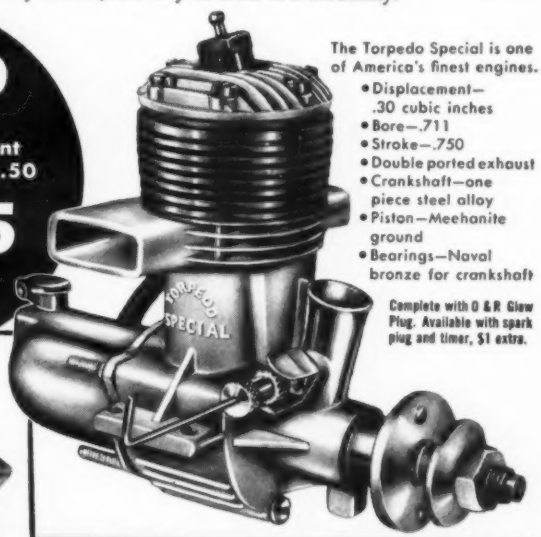

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Complete with O & R Glow Plug. Available with spark plug and timer, $1 extra.

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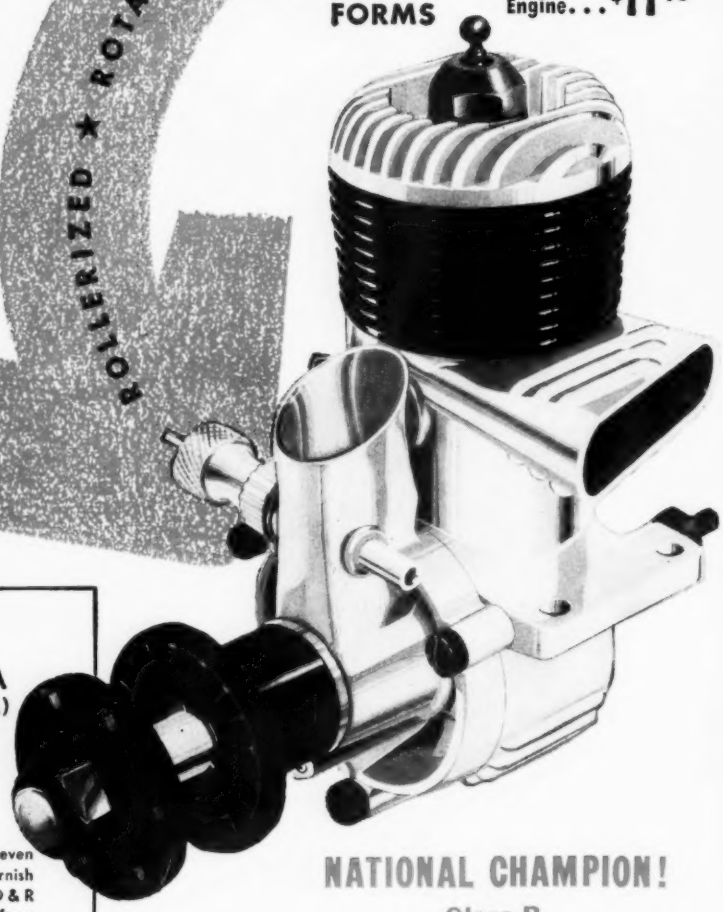

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